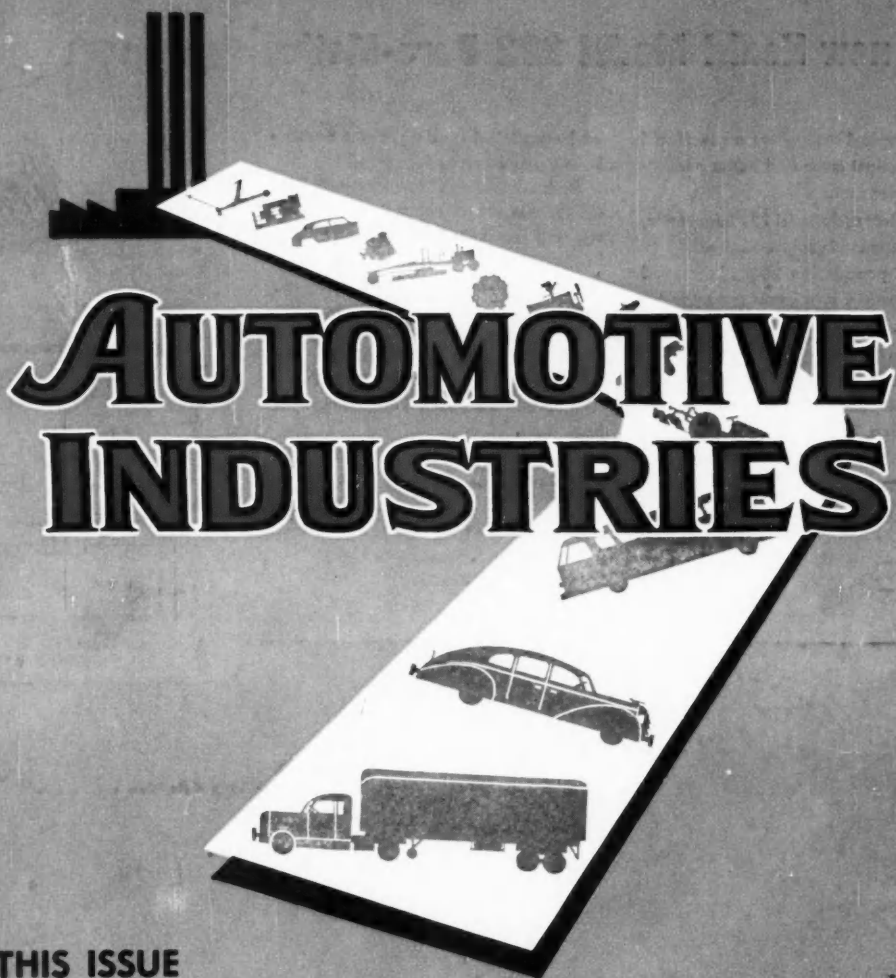


FEBRUARY 15, 1949



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**Skip Welding—The First Production Example**  
**Precision Manufacture of Hydraulic Valve Lifters**  
**What Makes Hot Red Engines "Hot"**  
**Remarkable Comeback of Italian Automobile Industry**  
**Nash's Simplified Body Design**

**Complete Table of Contents, Page 3**

## Compressor Blocks Now Finished

# 20% FASTER, and with HIGHER PRECISION

### on a new Heald Model 222 Bore-Matic

Here's a typical case where a new Heald machine meant more and better production at lower cost.

With this Heald Model 222 Bore-Matic, a manufacturer of compressor bodies has "upped" production 20%, improved product quality, and increased operator efficiency. Parts are now bored, faced and chamfered, two at a time, in a single automatic machine cycle. Faster indexing for greater cycle speed, constant feed hydraulic control for greater precision,

and simplified loading and handling have made these savings possible.

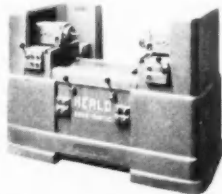
Such results don't "just happen." They are the end product of years of research and engineering to produce a new line of Bore-Matics as well as Internal and Rotary Surface Grinders, which are especially designed for your present-day needs. So, whatever your precision finishing problems, why not get in touch with your nearest Heald representative. His job is to help you do your job better, and at lower cost.



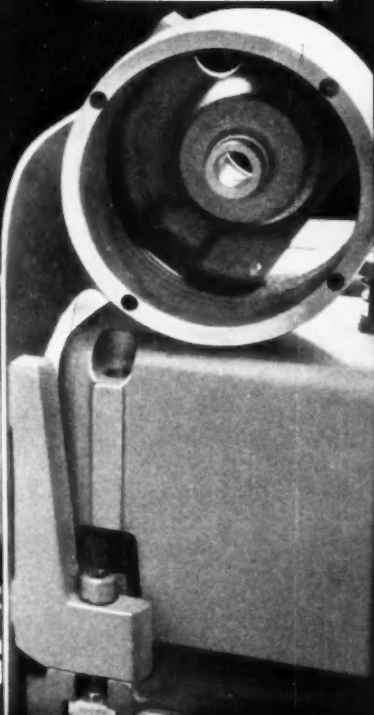
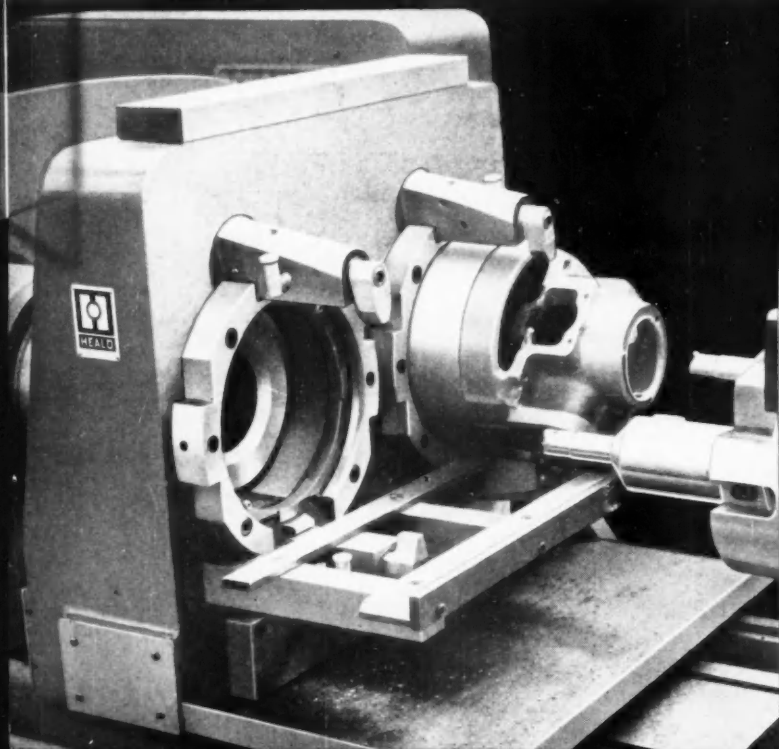
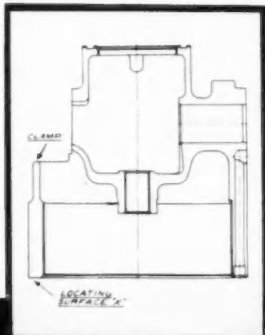
#### THE HEALD MACHINE COMPANY

Worcester 6, Mass.

Branch Offices in Chicago • Cleveland • Dayton  
Detroit • Indianapolis • Lansing • New York



Increased production of compressor blocks is due to a faster operating, easier loading new Heald Model 222 Bore-Matic. Drawing below shows surfaces barized.





# FITZJOHN *Super-power Duraliners...*



• Passengers are going to go places and get there faster... in safety and comfort... in the new Fitzjohn Super-Power Duraliners. Super-Power is *right*... with the high speed, High Output Waukesha Engine!

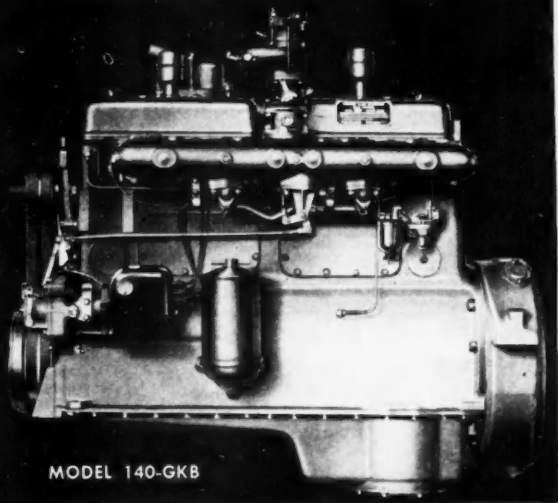
This motor coach is one of the first to be delivered, to the Georgia-Tennessee Coach Lines, Dalton, Ga. Made by the Fitzjohn Coach Company, Muskegon, Mich., Super-Power Duraliners have a 41 or 36 passenger capacity, depending on the type of seats; are 33' 5½" long, 8' wide, 8' 11½" high, with 254½" wheelbase.

Mounted at front center of coach is its Waukesha High-Output Model 140-GKB Engine—valve-in-head type, six-cylinder, 4½-in. bore x 5½-in. stroke, 525 cu. in. displacement, 178 hp. max. burning 75 octane gasoline.

It has all modern design features including—counter-balanced 7-bearing crankshaft of forged steel... hardened, wet type, removable cylinder sleeves... aluminum alloy pistons... Stellite-faced exhaust valves and inserts... hardened valve guides... replaceable, precision type, extra high capacity main bearing bushings... full pressure oiling. Send for Bulletin 1401.

**WAUKESHA MOTOR COMPANY**  
**WAUKESHA, WISCONSIN**  
 NEW YORK • TULSA • LOS ANGELES

## ...have High Speed High-Output **WAUKESHA ENGINES**



MODEL 140-GKB



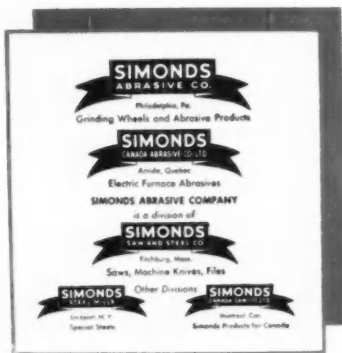
**SIMONDS**  
ABRASIVE CO.

PHILADELPHIA, PA.

**Grinding Wheels**



**Try this  
on your  
centerless grinder**



The proof of the pay-off is in its performance—in field reports revealing the facts and figures of superior finish, accurate stock removal and less cost—in the evidence that more and more users are adopting these wheels as standard—in the long record of top wheel performance duplicated on order after order.

These are the pay-off facts of superior wheel quality . . . mechanical accuracy in balancing and true running . . . and of wheel recommendations based on our practical knowledge of the centerless operation and long experience in providing the most efficient wheel for it.

Get the complete and factual pay-off details from our new centerless bulletin ESA-55. Write now.

**SIMONDS ABRASIVE COMPANY, PHILADELPHIA 37, PA. DISTRIBUTORS IN PRINCIPAL CITIES**

# AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

February 15, 1949

Vol. 100, No. 4

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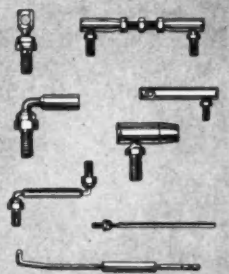
## TOUREK BALL JOINTS AND SCREW MACHINE PRODUCTS

1

### BALL JOINTS

The use of Tourek Ball Joints has helped many manufacturers to improve product performance, simplify design and reduce costs. These benefits are yours too when you specify Tourek!

Whether your specifications call for standard or special Ball Joints, you can depend upon Tourek performance, delivery and prices!



Send for your copy of Tourek's 16-page Ball Joint Catalog. It fully describes 12 standard types in 54 sizes (carried in stock), and has data on special types as well.



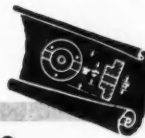
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### SCREW MACHINE PRODUCTS

Tourek's modern plant — from the tool room to the batteries of giant 6-spindle automatics — is geared to turn out your screw machine product needs in any size up to 2½", from any type of metal. Twenty-eight years of production experience back up every job which Tourek undertakes.



For prompt quotation on your screw machine products requirements, simply send blueprint or sample.



J. J. TOUREK MFG. CO.  
4701 W. 16th St., Chicago 50, Ill.

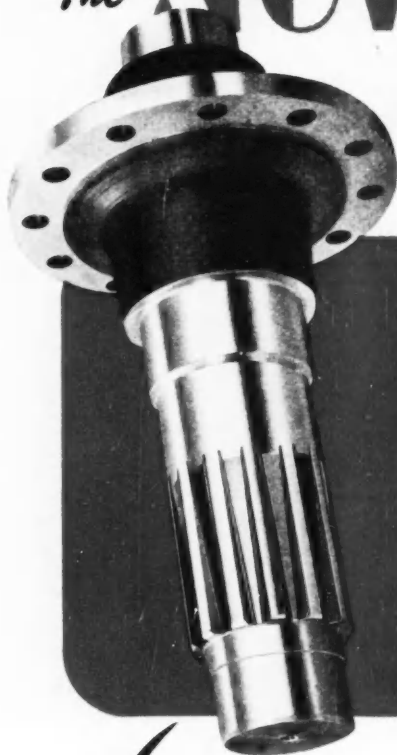


MAKERS OF QUALITY  
SCREW MACHINE PRODUCTS

ESTABLISHED 1920  
**TOUREK**  
FAMOUS BALL JOINTS

# The Newest DEVELOPMENT

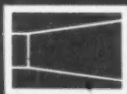
## IN POWER TRANSMISSION - TAPER ROOT INVOLUTE SPLINES



TAPER ROOT PARALLEL KEY HOBS REQUIRE SUBSTANTIAL GENERATING LUGS TO INSURE STRAIGHT AND PARALLEL KEYS TO THE ROOT DIAMETER, TO ELIMINATE ASSEMBLY INTERFERENCE. THESE LUGS ARE SUBJECT TO QUICK WEAR AND REDUCE HOB LIFE.



TAPER ROOT INVOLUTE HOBS REQUIRE GENERATING LUGS APPROXIMATELY 1/3 THE HEIGHT AND WIDTH OF THOSE USED FOR PARALLEL KEY DESIGN. IN SOME CASES THESE MAY BE ELIMINATED ENTIRELY, ADDING ADDITIONAL ROOT CONTACT AREA.



MATING HUB LOCATES ON THE TAPER. INVOLUTE FORM IS SELF-CENTERING. ALL LOAD STRESSES AND BEARING ARE EQUALIZED. STANDARD BROACHES ARE USED AFTER FINISHING THE TAPER HOLE TO SIZE.



SINGLE INVOLUTE HOB CUTS ANY STANDARD P. D. OF THE SAME PITCH, AND ANY CONVENTIONAL INCLUDED ANGLE. LESS STOCK REMOVAL PER TOOTH SPACE PERMITS LARGER SHAFT CAPACITY IN THE MACHINE.

### PROVIDES

**V** APPROXIMATELY 50% GREATER CONTACT AREA

### GIVES

**V** STRONGER MOUNTINGS WITH SIMPLIFIED TOOLING

### PERMITS

**V** EASIER MACHINING WITH PREDICTABLE ACCURACY, AT LOWER TOOL COSTS

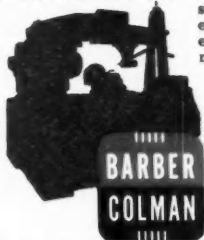


### Write

One of the outstanding advantages of Taper Involute Splines, recognized by design engineers, is that standard gear methods are used to

produce them. You are invited to send for full information on the methods used to hob these splines easily, rapidly and economically, using Barber-Colman Hobs and Machines.

Send prints and specifications for estimates to our engineers, Department 368.



# Barber-Colman Company

GENERAL OFFICES AND PLANT 368 LOOMIS ST., ROCKFORD, ILLINOIS, U. S. A.



ONE OF THE RESOURCES BEHIND A UNIQUE POLICY



Scale  
Model  
of a  
Problem

## *in piston ring production*

When you are producing piston rings in great volume, as Muskegon does, problems of handling materials for a high precision made product offer a continuous challenge.

It is the responsibility of the Planning Department, shown above around a scale model of the foundry layout, to devise the most efficient methods of material flow and material handling.

Muskegon's executive, engineering, metallurgical and production staffs are each represented to insure close coordination of all activities.

Facilities for planning, in all of its ramifications, are but one of the rich resources; in both plant and personnel, that stand behind Muskegon's *unique policy*.

# Policy

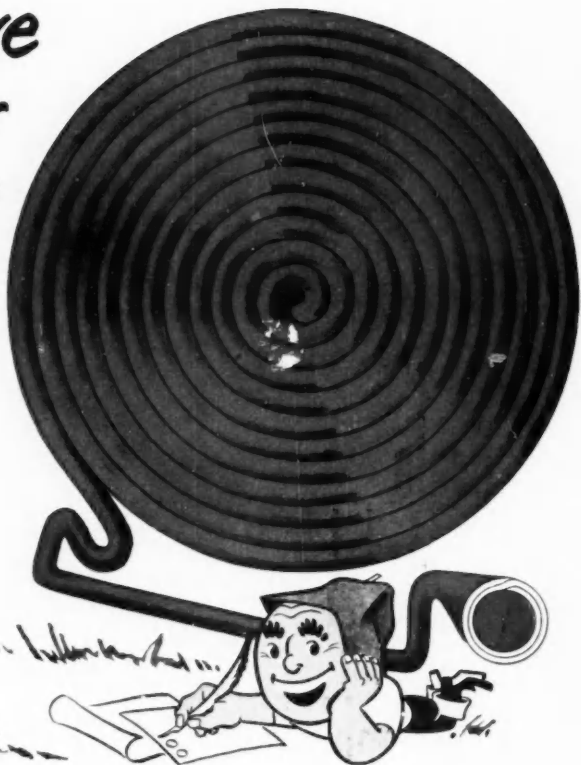
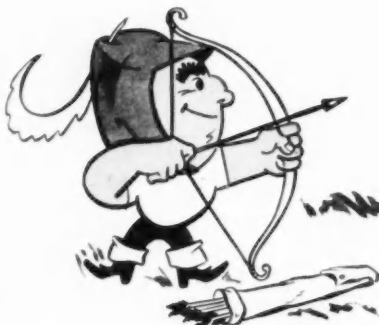
*"It is Muskegon's firmly established policy to sell exclusively to manufacturers (1) for installation as original equipment and (2) for resale for service purposes."*

## MUSKEGON Piston Rings

MUSKEGON PISTON RING CO.  
MUSKEGON, MICHIGAN  
PLANTS AT MUSKEGON AND SPARTA

"THE ENGINE BUILDERS' SOURCE"

# An automotive bull's eye for Bundyweld\* tubing



**Bundyweld** hits the bull's-eye as a tubing application on an average of twenty times in every car produced!

This fact is an indication of the outstanding position Bundyweld holds in the automotive industry. Examine its features and you, too, will find out why Bundyweld rates so highly.

Take the exclusive Bundyweld process, for example. This process gives Bundyweld a double-walled thickness rolled from a single strip of metal, insuring the additional strength so vital in automotive tubing.

The copper brazing process through 360 degrees of Bundyweld's wall contact means no leaks under pressure, and prolonged life under heavy vibration.

Hard wear and abuse in fuel lines, brake lines, and other functional uses in gasoline- or Diesel-engined vehicles have proved Bundyweld's value in the automotive field.

Why not get all the facts on Bundyweld by contacting your nearest Bundy representative among those listed below? He'll be glad to give them to you. Or contact us directly: **Bundy Tubing Company, Detroit 14, Michigan.**

## BUNDY TUBING



### WHY BUNDYWELD IS BETTER TUBING

**1** Bundyweld Tubing, made by a patented process, is entirely different from any other tubing. It starts as a single strip of basic metal, coated with a bonding metal.

**2** This strip is continuously rolled twice laterally into tubular form. Walls of uniform thickness and concentricity are assured by close-tolerance, cold-rolled strip.

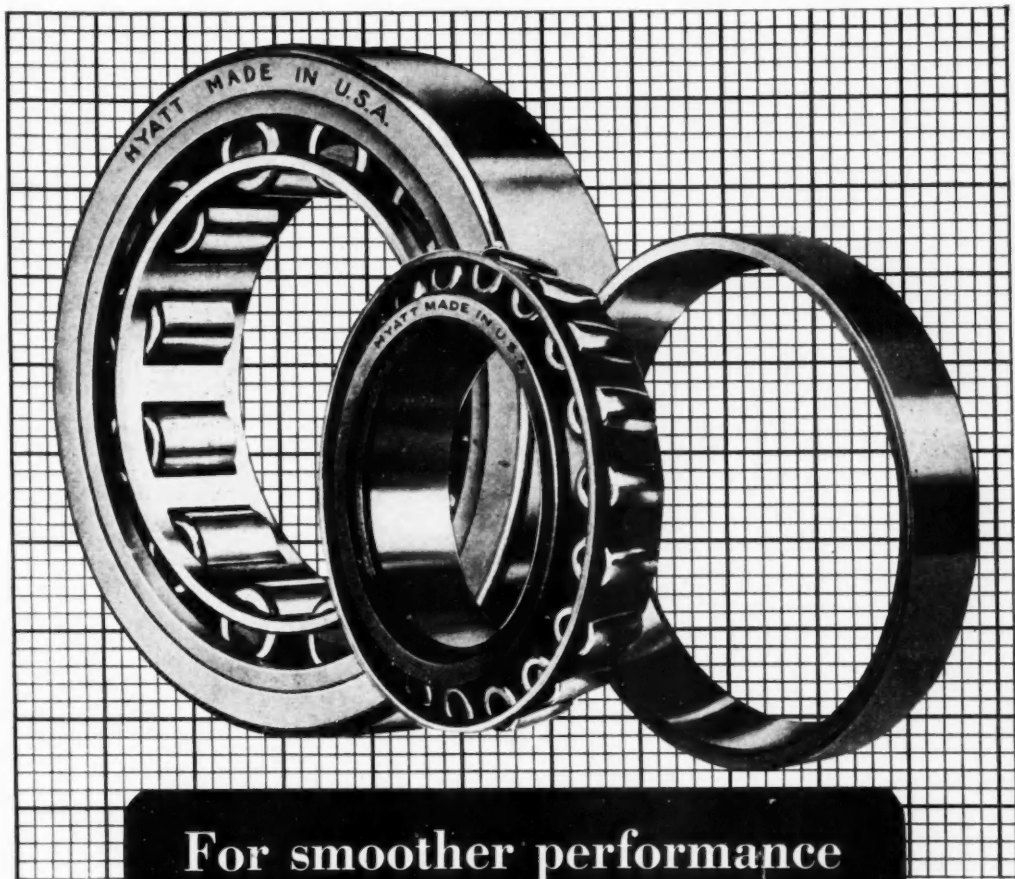
**3** Next, a heating process fuses bonding metal to basic metal. Cooled, the double walls have become a strong ductile tube, free from scale, held to close dimensions.

**4** Bundyweld comes in standard sizes, up to 3/8" O.D. in steel (copper or tin coated), Monel or nickel. For tubing of other sizes or metals, call or write Bundy.

### BUNDY TUBING DISTRIBUTORS AND REPRESENTATIVES

Cambridge 42, Mass.: Austin-Hastings Co., Inc., 226 Binney St. • Chattanooga 2, Tenn.: Peirson-Deakins Co., 823-824 Chattanooga Bank Bldg.  
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BUNDYWELD NICKEL AND MONEL TUBING IS SOLD BY INTERNATIONAL NICKEL COMPANY DISTRIBUTORS IN PRINCIPAL CITIES.



## For smoother performance team up with Hyatts

**C**ARS, trucks and buses with Hyatt Roller Bearings designed into important positions have, through many years, delivered Hyatt-quiet quality and satisfaction to builders and buyers.

You naturally expect the Hyatt folks who created the first roller bearing to acquire special skills and develop manufacturing methods enabling them

to produce the finest roller bearings. We have done just that.

Millions of Hyatt-equipped motor vehicles are giving smoother performance because of quiet Hyatts.

Hyatt Bearings Division General Motors Corporation, Harrison, New Jersey, and Detroit, Michigan.

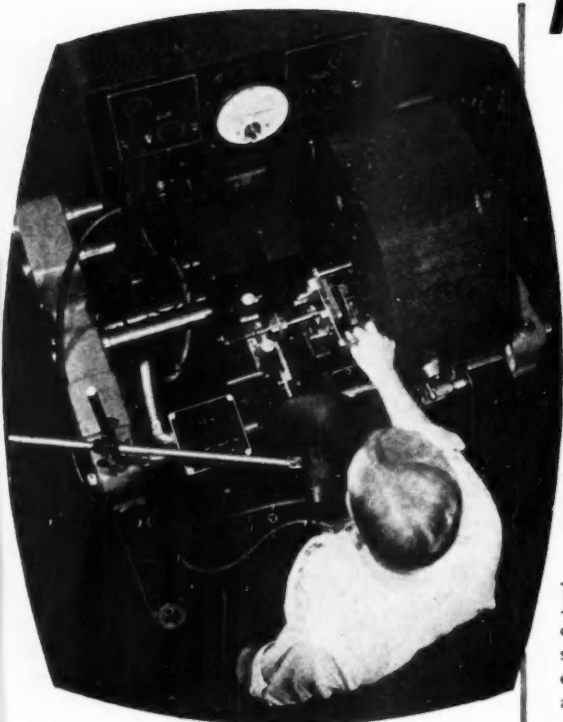
# HYATT ROLLER BEARINGS

# 1 MACHINE

handles all

# 3 STEPS

of the complete  
balancing process!



- 1 Locates and measures the unbalance
- 2 Corrects the unbalance
- 3 Inspects for over-all accuracy

at the rate of  
**100 PIECES PER HOUR!**

Balancing these fans for vacuum sweepers is now done completely on *one* machine. It takes only a few seconds to locate and measure the unbalance. Then, the operator turns the piece to the proper angle and turns a hand-wheel to correspond with the meter reading. At the press of a button, a fly-cutter removes the exact amount of metal to bring the part into balance. The part may be rechecked if desired.

The inclusion of correction equipment indicates the modern trend in balancing with Gisholt DYNETRIC Balancers. It saves handling—only one loading is required to complete all three steps.

Those who are concerned with balancing of rotating parts have learned that it's wise to specify Gisholt.

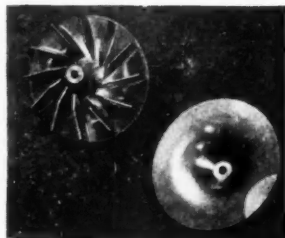


**GISHOLT MACHINE COMPANY**  
Madison 10, Wisconsin

THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface finishing, and balancing of round and partly round parts. Your problems are welcomed here.



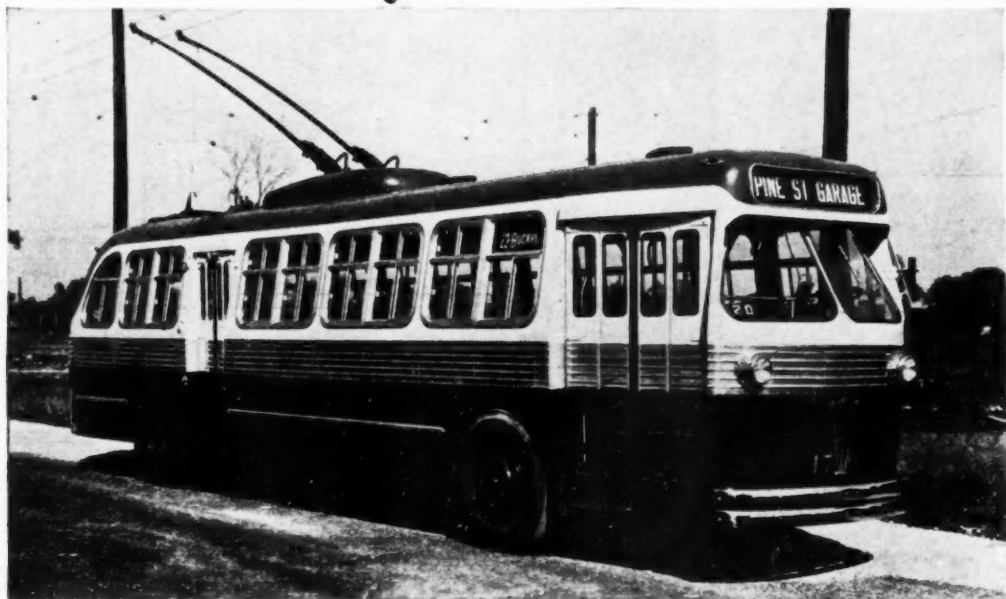
Showing front and back of fan with metal removed to correct unbalance. The entire balancing operation required an average of less than 45 seconds per piece.



TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES • SUPERFINISHERS • SPECIAL MACHINES



# Steering AT ITS BEST



NEW ST. LOUIS TROLLEY COACH

## ROSS BRINGS EASE . . . AND ECONOMY

NEW AND ADVANCED styling and engineering are incorporated in this fine new trolley coach, the product of the St. Louis Car Company. Other outstanding features are definite economy in maintenance, built-in sturdiness and light weight. And, naturally, we are proud that Ross Cam and Lever Steering is also a feature.

Experience gained through the use of Ross steering gears on military vehicles during world war II has led to current improvements in Ross design, resulting in:

- (1) Increased mechanical reduction . . . (2) More compactness of design . . . (3) Reduction in weight . . . (4) Greater arm angular-travel . . . (5) Improved metallurgy . . . (6) Increased efficiency.

Throughout 42 years of leadership in this industry, Ross gears have been distinguished for long life, simplicity of adjustment and maintenance of long-recognized qualities of safety, stability and performance. We invite discussion of any steering problem.

**Ross**

**Cam & Lever STEERING**

**ROSS GEAR AND TOOL COMPANY • LAFAYETTE, INDIANA**

AUTOMOTIVE INDUSTRIES, February 15, 1949

CONSULT WITH  
RESISTANCE  
WELDING ELECTRODE  
HEADQUARTERS

It takes all three...  
**SKILL, EXPERIENCE AND TOOLS**  
...to make the forgings you need

It takes years of training to acquire the skill to properly forge one of these large seam welding wheels.



## MALLORY CAN SUPPLY YOU!

If you need seam welding wheels, rods, rectangles, die blocks, bearings, bushings, shafts, spindles, or special shapes . . . made of hardenable copper alloys which are specifically designed for the job . . . you want to see Mallory!

Mallory metals and designs are the result of years of research and engineering skill in the Resistance Welding field. Mallory has perfected methods of hot forging, heat treating and cold forging that give Mallory forged alloys the maximum uniformity in density and hardness.

Whatever your Resistance Welding problem, Mallory can supply your needs from one of these forged alloys . . . all have special characteristics for efficient operation on special jobs . . . Mallory 3\*, Elkaloy A\*, Mallory 53-B, Mallory 73, Mallory 100.

SEND YOUR SPECIAL FORGING PROBLEMS TO MALLORY, AND BE SURE!

*In Canada, made and sold by Johnson, Mathew & Mallory, Ltd., 110 Industry St., Toronto 15, Ontario.*



**Resistance Welding Tips, Holders, Dies, Rod and Bars, Castings, Forgings**

**P. R. MALLORY & CO., Inc.**  
**MALLORY**

**P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA**

### SERVING INDUSTRY WITH

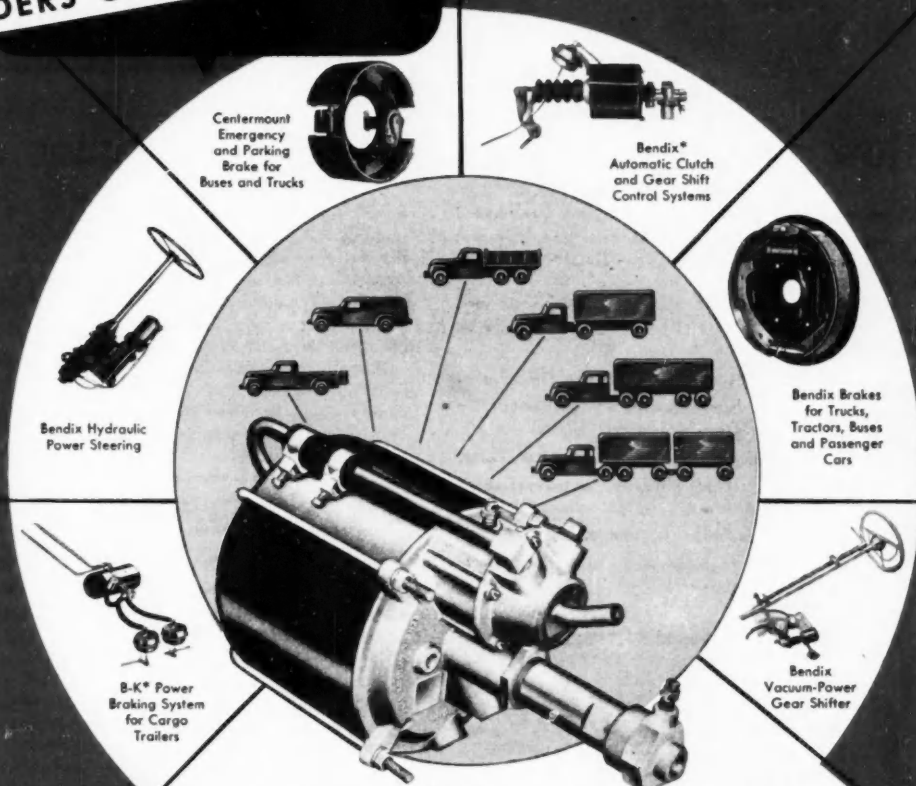
Capacitors    Rectifiers  
Contacts      Switches  
Controls      Vibrators  
Power Supplies

Resistance Welding Materials

\* Reg. U. S. Pat. Off.

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BUILDERS OF THE BASICS OF BETTER MOTOR VEHICLES.



From Half-Tonner to Highway Giant

## HYDROVAC\*

the World's Most Versatile Power Brake!

**BENDIX PRODUCTS**

**DIVISION of**

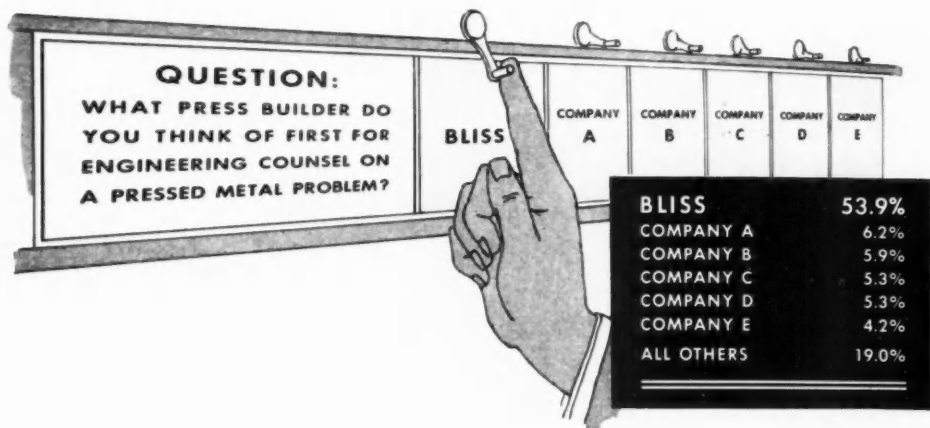


**SOUTH BEND 26, INDIANA**

Export Sales: Bendix International Division,  
72 Fifth Avenue, New York 11, N.Y.

More truck capacities and types are served by Bendix Hydrovac power braking than by all other power brakes combined! This versatility actually *lowers* the cost of Bendix power braking because it has resulted in such widespread usage and quantity production. Regardless of size, therefore, every truck you make or own can be Hydrovac-equipped at a price in line with the truck's original cost—an exclusive Hydrovac advantage! Contact the factory for specific information.

\*REG. U.S. PAT. OFF.



## How press users voted on this vital question

These returns from a recent impartial survey, conducted among press users ranging from the smallest to the largest companies, tell the story in ballots—"BLISS"—by a wide margin.

Such overwhelming preference for "BLISS" is confirmed on pressed-metal production lines everywhere. Let's look at just a few case examples:

**97% of Hudson Motor's presses are Bliss-built.**

**100% of Florence Stove Company's presses at the Lewisburg, Tenn., plant are Bliss.**

**70% of Young Radiator Co.'s presses are Bliss.**

**325 Bliss presses in the Murray Corporation of America's plants.**

**318 Bliss presses at Stewart-Warner.**

This continuing vote of confidence for Bliss equipment is duplicated in every major pressed-metal producing in-

dustry. It's so because at Bliss, a 90-year fund of press-building and stamping knowledge is continually at work developing the ways and means of increasing productivity of both operator and machine. You see the end results in modern, easy-to-operate equipment with automatic feeding, indexing and ejecting features along with longer die life and reduced maintenance.

Bliss engineers are actively engaged, too, in solving the new problems in the field of light metals and powder metallurgy, where the factors governing the forming, forging, drawing and stamping of steel, copper and brass do not apply.

You can put this pressed-metal knowledge to work by sending for a Bliss sales engineer today.

See our Catalog in Sweets or write for Bulletin 35-B

**E. W. BLISS COMPANY, DETROIT 2, MICHIGAN**

*Mechanical and Hydraulic Presses, Rolling Mills, Container Machinery*



A section of the engineering department at Bliss' Toledo plant.



**BLISS** BUILDS MORE TYPES AND SIZES OF PRESSES  
THAN ANY OTHER COMPANY IN THE WORLD



**"BRAINS"** of the leading  
Business Machines are made from  
**J & L cold-finished JALCASE STEEL...**

**J&L  
STEEL**

*Monroe*

**Smith-Corona**

*National*

**IBM**

*Addressograph*

CASH REGISTERS • ADDING MACHINES  
ACCOUNTING MACHINES

**FRIDEN**

**ALLEN & WALES**

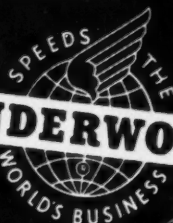
★ **MARCHANT** ★



*Multigraph*

**Commercial  
Controls  
CORPORATION**

*Remington Rand*



**UNDERWOOD**

**...the original, free-machining, cold-finished open-hearth steel ... for better quality precision parts at lower cost.**

Look inside a business machine of any leading make, and most likely you'll be looking at a mass of precision parts accurately machined from J&L cold-finished *Jalcase* Steel. To the uninitiated, the "brains" of these modern marvels appear like an insolvable maze, but every tiny gear, lever and cam has a definite job to do—a definite function to perform for rigid accuracy.

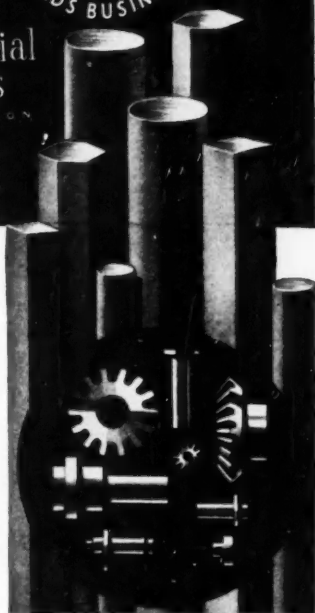
There are some sound business reasons why so many of these working parts are made from J&L *Jalcase*—the original, free-cutting, open-hearth steel:

● *Jalcase* is the leading free-cutting steel—and has been for more than 25 years.

- It machines smoothly and easily at high speeds.
- It lengthens tool life and reduces the number of stops for re-tooling.
- It is easily and quickly heat treated.
- It has high wear resistance.
- Ten grades plus a number of special treatments offer the *Jalcase* user a wide range of desirable properties.

If you machine steel in the manufacture of your products—investigate *Jalcase*!

We have just published a new brochure on cold-finished *Jalcase*, and shall be glad to send a copy to anyone interested in machining rod and bar stock. The coupon at the right is for your convenience.



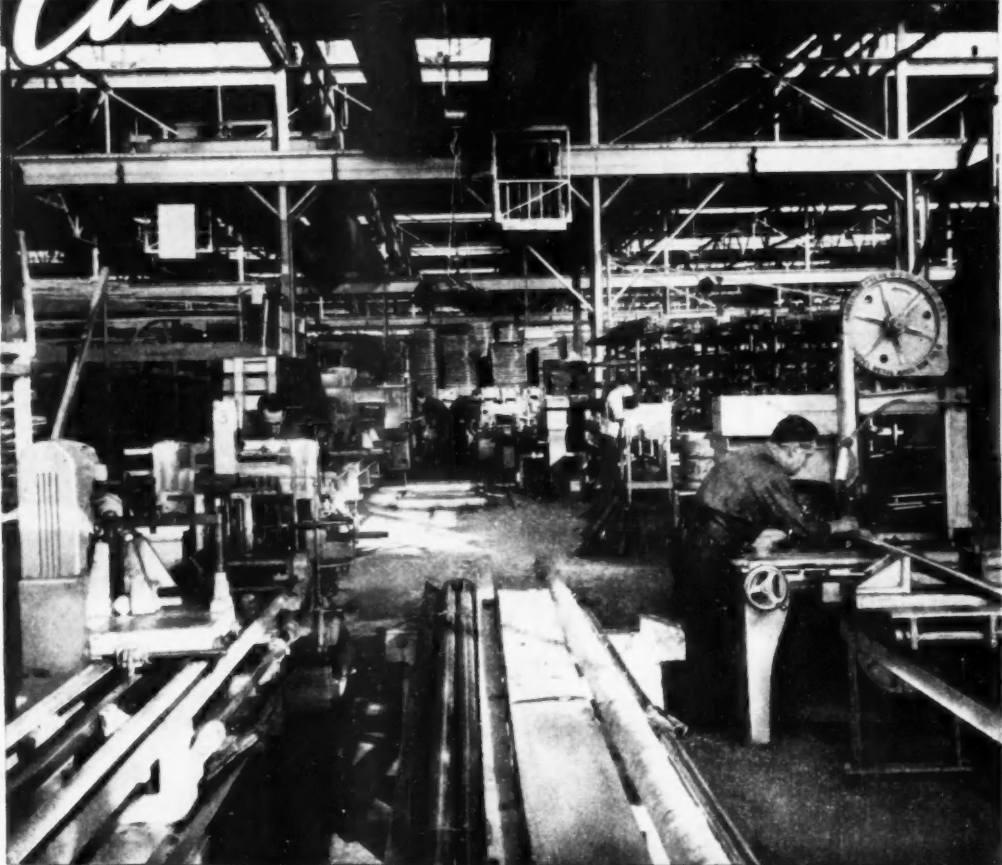
Jones & Laughlin Steel Corporation  
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# AUTOMOTIVE INDUSTRIES



The Authoritative Technical and News Magazine  
That Gives Comprehensive Coverage, Domestic  
and Foreign, of These Industries:

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**AUTOMOTIVE  
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Engine  
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Trailer  
Road Machinery  
Farm Machinery

Parts and Components  
Accessory  
Production Equipment  
Service Equipment  
Maintenance Equipment

## High Spots of This Issue

### What Makes Hot Rod Engines "Hot"

Some of the tricks of the hot rod "artists" which enable their "souped-up" roadsters to accelerate from a standstill to 60 mph in 8 secs—to go over 70 mph in 1st gear, 90 mph in 2nd gear, and 150 mph in high—are dished up in a dandy article you'll like, by John Bond, "given the gun" this issue on page 32.

### Further Decline in Strikes

Government statistics show fewer strikes in 1948, fewer workers involved, and less time lost from production lines than in any years since the beginning of the final war year of 1945. Karl Rannells, of the Washington Bureau, AUTOMOTIVE INDUSTRIES, reports on this labor situation under the Taft-Hartley Act, as demand for repeal of the act continues. See page 25.

### Simplified Body Design Aids Production Efficiency

Nash Motor Car Co., by making many parts interchangeable for various body types, has reduced the number of different stampings formerly necessary in its car fabrication. Detroit Editor Joseph Geschelin takes you along the assembly lines, pointing out also an ideal answer to the body soldering problem achieved in the '49 Nash. Turn to page 28.

### Italy's Remarkable Comeback

Special European Correspondent W. F. Bradley in this account comments on the spirit of enterprise which has afforded speedy rehabilitation of war-ravaged automotive plants in Italy. Notably the comeback of the Fiat Mirafiori works at Turin—a huge plant on 247 acres inaugurated by Mussolini—is described, starting on page 36.

### Ultra-Precision Manufacture of Hydraulic Valve Lifters

In producing tolerances and fine surface finishes measured in terms of millionths of an inch the Diesel Equipment Division of GM relies upon the accuracy of machines rather than on operator skill. This article touches on some of the ultra-precision work performed on the body and plunger of hydraulic valve lifters, beginning on page 42.

### 25 New Product Items

### And Other High Spots, Such As:

The important part palletizing plays at the Ferguson Tractor Plant; likelihood that 5-W engine oil answers sub-zero operation; a French automotive design applied to rail car bogeys; first production example of high speed, skip welding; new Diamond-T Diesels; a magnetic induction drive; and Cadillac's special machines for cylinder block production.

**News of the Automotive Industries, Page 17  
For Complete Table of Contents, See Page 3**

# **STEEL ALLOCATIONS**

## **and**

### ***What We Are Doing About Them***

As you know, the Steel Products Advisory Committee recently agreed to a six month extension of voluntary allocations of steel for most industries already included in the allocation program—and the President has now asked for authority to establish priorities and allocations for key materials in short supply. On the face of it, this action and stepping up of steel requirements for defense and the Marshall Plan point toward a continuation of peak demand for steel.

But remember that steel distributors in general and Ryerson in particular will always be in there battling to make available to you the largest possible tonnage.

Last year Ryerson was able to serve over 50,000 manufacturers, builders, and utilities. This year we expect to serve many thousands more.

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# NEWS *of the* AUTOMOTIVE INDUSTRIES

Vol. 100, No. 4

February 15, 1949

## **Chrysler and Packard Plan 1949 Anniversary Models**

This year will see two anniversary models by automobile manufacturers. Chrysler will label its 1949 models as its silver anniversary line, commemorating the 25 years the company has been in business. Packard will have a model change about mid-year, at which time it will bring out its golden anniversary line in observance of its 50-year history. The Packard change will be a noticeable one stylistically, but the basic design will not be changed sufficiently to require new body dies. A possible indication of what Packard has in mind may have been given by Karl M. Greiner, vice president and general sales manager, who said that he believes the public will soon begin to see more "character lines" in automobiles. He said the present trend toward streamlining is near "the saturation point and if it is carried much further we are likely to wind up with something that resembles a cigar on wheels!"

## **Nash Sales Manager Sees Record Year**

H. C. Doss, Nash vice president in charge of sales, cites several reasons why he is looking for a banner year in automobile sales during 1949. He says that ten years ago employment in this country stood at 44,220 million with national income of \$67.4 billion. Today employment stands at 60 million and national income has risen to \$220 billion. In addition, approximately 11 million additional family units have been created and national population, since the last census, has increased from slightly below 130 million to 146.5 million. As a result the market potential, he says, has vastly expanded in the last decade.

## **Crosley to Hike 1949 Output to Over 50,000 Units**

Declaring that he is convinced more than ever that price will be the determining factor in the automobile industry this year, Powel Crosley, Jr., president of Crosley Motors, Inc., has disclosed that the 1949 production sched-

ule of his company will be boosted to over 50,000 units. The expected Crosley output for 1949 will almost double the production for 1948. Mr. Crosley said that his company had completed retooling for all five of the new models introduced recently, with no overall price increase.

## **GM to Stage Detroit Automobile Show**

GM will move its Transportation Unlimited exhibit which was displayed in New York intact to Detroit for a showing to be held April 9-15. It will be the first automobile and product showing held in Detroit since before the war. The exhibit includes 30 of the latest GM passenger car models and many other mechanical displays showing research, styling, and engineering activities.

## **All-Steel Station Wagon Added to Chevrolet Line**

Chevrolet will offer two station wagon models this year, one of them the conventional wood body and the other all steel. Both models, however, will have solid steel turret tops. Both are four-

door models with the spare tire placed beneath the floor, and are priced at \$2150, fob Flint.

## **Reo Motors To Build New Truck Engine**

Reo Motors, Inc., is planning to produce a new truck engine. This is revealed in a company announcement that it has negotiated a five-year term loan in the amount of \$5.7 million with the RFC and a Lansing bank. Of the total, \$1,694,000 will be used for the settlement of 1945 renegotiation refund to the government, and the balance of the loan will be used for facilities to produce the new truck engine.

## **Willys First Quarter Fiscal Net Tops \$1.8 Million**

In reporting the financial results for the first quarter of its current fiscal year ended Dec. 31, 1948, James D. Mooney, president and board chairman, Willys-Overland Motors, reported a net profit of \$1,847,801 and sales of \$49,710,797. During the first quarter of the previous fiscal year, sales of \$41,128,206 resulted in a net profit of \$1,283,445.



## **BRITISH INVADER**

The British Nuffield Organization recently displayed this new Morris Minor convertible together with a two-door sedan in New York City. The new models have an overall length of 12 ft. 4 in., and a wheelbase of 7 ft. 2 in. Featuring independent torsion bar suspension in front, they are powered by a four-cyl engine.

# NEWS of the AUTOMOTIVE INDUSTRIES

## Chrysler to Offer Nylon Fabric on Some Models

The Chrysler Corp. will introduce a new type of all-nylon fabric on certain of its Chrysler division models as standard equipment. It also will offer two nylon-faced fabrics on two other models. The fabric has been under development for five years and has been subjected to rigorous tests for strength, fading, color fastness, and frictional wear. The all-nylon cloth will be standard on the Windsor club coupe, four-door and convertible, and on the New Yorker convertible. It will be optional on other models.

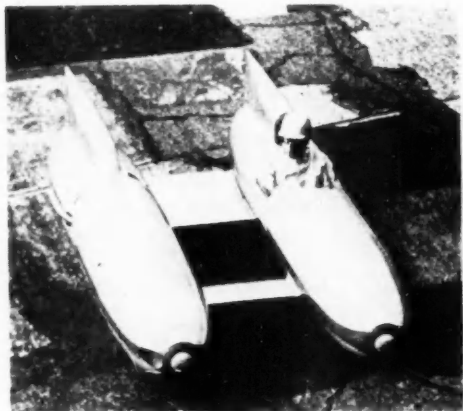
## Ford Forms New Foreign Company

Aimed at coordinating and assisting all of its international affiliates, the Ford Motor Co. has formed the Ford International Co. This unit will have no stock interest in any of Ford's overseas subsidiaries, branches or associated companies, and the Ford Motor Co. will continue its interest in these operations. Heading this new company as president will be Graeme K. Howard, vice-president of Ford's International Div.

In making this announcement, Henry Ford, II, stated that this is a further step in the program to extend substantially the activities of all Ford companies in the international field. He added that we believe that the world as a whole must increase its capacity

## TERRIFIC TARUFFI

Breaking six International Class (500 cc) records recently on the Milan-Brescia, autostrada in Italy, Piero Taruffi drove this unique vehicle at a speed of about 128 mph. His racer, which is a little over three ft high, is powered by a twin-cyl Guzzi engine, developing about 50 hp, which is located at the rear of the right-hand fuselage and which drives both rear wheels.



to produce and thus to give the people of the world more food, more clothing, better transportation, more hope and greater security. Any such world program will inevitably create an expanding need for trucks, tractors and transportation.

The Ford International Co. is designed to help Ford affiliated enterprises in various parts of the world, to improve their products, increase their distribution, keep their methods modern, and meet financial, supply, exchange, engineering, manufacturing, sales and human relations problems.

Members of the board of directors of

the Ford International Co. will include Mr. Ford, Mr. Howard, E. R. Breech, executive vice-president, Ford Motor Co., and the following Ford vice-presidents: W. T. Gossett, general counsel; J. R. Davis, sales and advertising; L. D. Crusoe, finance; H. T. Youngren, engineering; D. S. Harder, manufacturing; and Benson Ford, general manager, Lincoln-Mercury Div.

Sir Stanford Cooper, vice-chairman of the Ford Motor Co., Ltd., the English company, and Douglas Greig, president of the Ford Motor Co. of Canada, Ltd., have been invited to serve on the board of directors.

The headquarters of the new company will be in New York City; however, the engineering and manufacturing staffs will be located in Dearborn, integrated with the corresponding divisions of the Ford Motor Co. In addition, Ford International Co. proposes to establish an overseas distributors' branch which will be located in Jersey City, N. J.

## Nash Joins Kaiser-Frazer In Fight on Credit Curb

Nash is the first automobile company to publicly back Kaiser-Frazer in an attack on Regulation W. H. C. Doss, vice president in charge of sales for Nash, in a telegram to Henry Kaiser advocated doing away with it. Dealers at their annual convention in Los Angeles in January also went on record as opposing the credit curb. Nonetheless, it appears that it will be quite some time before any action will be taken, since the matter is yet not up to Congress. There is no doubt that many prospective buyers for all makes of cars have canceled orders because of inability to meet the minimum \$70 month payments. However, in most cases the ef-



## DIAMOND'S NEW DIESEL

This new Diamond T Motor Car Co. truck-tractor, Diesel Model 910N, is powered by a six-cyl. NHB Cummins Diesel engine which develops 200 hp at 2100 rpm. As a tractor, it is designed for up to 76,000 lb gross train weight. The four-wheel tractor is available in 157 $\frac{3}{4}$  in. and 172 $\frac{3}{4}$  in. wheelbases, and the six wheel models from 186 $\frac{3}{4}$  in. wheelbase upward.

# NEWS of the AUTOMOTIVE INDUSTRIES

fect has been to reduce the number of unfilled orders on the dealers' books rather than to cause cars to back up in showrooms, particularly in the Big Three lower priced lines.

## Packard Placing Dealers On Three-Year Basis

In San Francisco recently, Karl M. Greiner, Packard Motor Car Co. vice-president and general sales manager, announced that the company will place its qualified-dealer franchises on a three-year basis next March 31. Mr. Greiner pointed out that under present general practice in the automobile industry, dealer franchises are renewed each year. Packard produced 98,898 cars in 1948, a record output, second only to the 109,518 cars built in 1937. This year, Mr. Greiner said that Packard expects to better the 1948 total by about 30 per cent.

## ACF-Brill Delivers Giant Bus for New York City Test

Seating 48 or 50 passengers, what is described as the largest single deck city bus as yet built was recently delivered to the New York City Board of Transportation by the ACF-Brill Motors Co. for a 90-day test operation. Weighing 20,000 lb., this bus measures 39 ft. 6 in. in overall length; 102 in. in width; and 117½ in. in height. It has a 247-in. wheelbase.

## Name Withers Director of GM Customer Research

Roland S. Withers has been named director of the Customer Research Section of the GM Distribution Staff, succeeding the late Henry G. Weaver. Mr. Withers had been serving as assistant director of the section.

## Trend to Selling Replacing Waning Buyers' Market

Much is heard currently about the slump in automobile sales, a return to the buyers' market, and the effect of Regulation W. A survey in Detroit shows independent dealers particularly to be heavily stocked. Dealers in the Big Three lines are finding considerably more evidence of reduced demand. Nonetheless, it would be an error to project the Detroit situation across the country as a whole. Generally, the automobile manufacturers are showing no particular concern. All of them are optimistic about prospects this year for banner

production. They point out that while dealers in some areas are admittedly carrying heavier inventories than at any time since the war, especially in higher priced independent lines, there are dealers in other parts of the country who are begging for more automobiles. Immediate delivery is not uncommon among all of the independents, and for even some lines put out by the Big Three. However, factory sales managers are unanimous in their belief that the seasonal factor is heavily responsible for the current slow sales, coupled with some effect of credit regulations, and a general slowing down of business. Nonetheless, they are confident that dealers can sell all of the automobiles they get if they work at it, and there is evidence that a return to traditional selling practices by dealers is under way.

Everyone is agreed that price is the major factor now and that better selling and better trade-ins are definitely coming back rapidly. Most companies have instituted intensive salesmen training for their dealers and advertising and promotional activity is being stepped up. In general, the outlook is for a return to the buyers' market this year for practically everyone in the industry, with more aggressive selling required and with used cars bringing better trade-in values to new car buyers and bearing a more realistic price on used car lots.

## Nash and Chevrolet Plan Record Car Advertising

Another indication that automobile companies are looking for a more

rugged sales battle this year is seen in an announcement of advertising budgets by both Chevrolet and Nash, which say that they will have the largest national advertising campaigns in their history this year.

## Briggs Buys Ohio Plant For Stamping Operation

The Briggs Mfg. Co. has purchased the Upper Union Mills of Carnegie Illinois Steel Co. in Youngstown, O. Only recently, Briggs had announced that it was abandoning plans to locate a plant in the Pittsburgh area. The Youngstown property will be used for a large stamping plant and work will begin immediately to remodel a part of three buildings so that operations can start there in April. The plant consists of 18 acres and 280,000 sq ft of floor space. It is expected that the operation will eventually represent an investment of several million dollars, although the purchase price was not revealed.

## Packard Loses Contract For Jet Development

The U.S. Air Force has terminated its contract with Packard for jet engine development at Toledo. Packard has been operating a plant there for the USAF since 1945 under an agreement with the Air Materiel Command of Wright Field. No reason was given for the termination of the project, which was under the direction of Arthur Nutt, Packard director of aircraft engineering. He said that most of the 476 plant and laboratory employes will be laid off immediately.



## SPEEDY TRANSFORMATION

Unofficially timed at 158 mph, this hot rod racer was built from the belly tank of a P-39 fighter plane. Bob Tattersfield, the car's owner, is planning a trip to the Bonneville Salt Flats where he hopes to hit 200 mph. The driver at the moment is Colleen Townsend.

# NEWS of the AUTOMOTIVE INDUSTRIES



## ROYAL DIMINUTIVE

Now being built by the Midget Motors Mfg. Co., Athens, O., the new King Midget, shown above, has an all-steel body and weighs 330 lb. Powered by a 6-hp air-cooled engine, it reportedly has a top speed of 50 mph.

## Midget Motors Building 15 Cars a Day

The Midget Motors Mfg. Co., Athens, O., is currently producing about 15 new King Midget (see photograph on this page) automobiles a day. Designed for use as a general utility vehicle, the King Midget has a wheelbase of 67 in. and an overall length of 8 ft. Although a 6-hp air-cooled engine is recommended for this car, various types of engines may be had at the buyer's option.

## Chrysler Stocking Dealers For New Model Showings

All divisions of the Chrysler Corp. are in production of 1949 models. The first to make an official public announcement of its cars will be Dodge, slated for Feb. 25. DeSoto will be second a few days later. The Chrysler announcement will be made to the public March 13, and Plymouth will be last, shortly after the 15th of March.

## Security Demands Dominate Union Drive

Hourly wage rate increases will have a subordinate place in the UAW-CIO wage drive which gets under way soon in the automotive industries. Walter Reuther, president, has announced officially that the major emphasis will be on pension and social security plans with wage demands secondary. The three point program includes: (1) an adequate pension and retirement program; (2) a comprehensive social security program including health, hospitalization, medical, surgical, disability, and life insurance benefits; (3) a wage

increase to restore buying power of wages to the level of June, 1946, when the OPA was abandoned. Contract negotiations with Ford and Chrysler are expected to get under way in May, with the major drive being directed against Ford.

It has been estimated that if such a plan were adopted in the industry, expenditures during the first year for benefits would be about \$100 million, not taking into account the original funding cost of such a project or the contributions that would have to be put into the fund each year. The Ford pension plan which the workers rejected in 1947 was to have been jointly financed by the company and the individual employee.

## Name Coogan President of Autocar Co.

The directors of the Autocar Co., Ardmore, Pa., have elected Edward F. Coogan, formerly executive vice-president, as president, succeeding Robert P. Page, Jr., who has resigned for reasons of health, and who has been elected chairman of the board.

## Hunt Retires From K-F, In Industry 40 Years

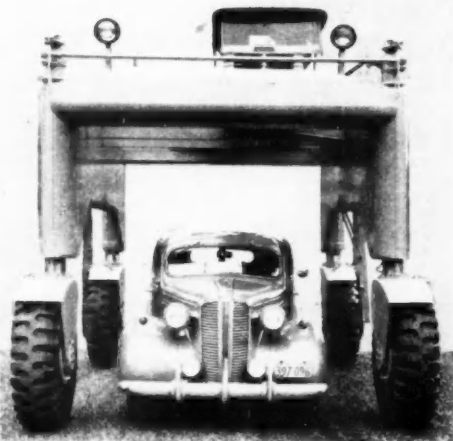
E. J. Hunt, manager of operations for Kaiser-Frazer, has retired after 40 years in the automobile industry. He joined K-F in 1945 and was responsible for converting the Willow Run plant to automobile production, and later for stepping up efficiency at the Detroit Continental Engine plant about 300 per cent in five months. Prior to joining K-F he had been with the Chrysler Corp. from its beginning in 1924, and was in charge of the Detroit Tank Arsenal during the war, where he attained national recognition for winning the first Army-Navy E award. He began his automotive career with the old EMF Co. and was later with Maxwell which was subsequently taken over by Chrysler.

## U. S. Rubber Consumption for 1948 Over 1 Million Tons

The staggering amount of U. S. consumption of new rubber for 1948 is revealed by the Rubber Manufacturers Association, Inc., which reported that for 1948 estimated consumption amounted to 1,073,250 tons. This ton-

## PASSING OVER

Designed for pipe laying, this giant straddle truck, the widest ever built by the Hyster Co., Portland, Ore., is 11½ ft wide, 13 ft high, and 16¼ ft long. The 30,000-lb capacity truck has been shipped to the Boh Brothers Construction Co., New Orleans, where it will be used to straddle ditches in handling 40-ft sections of steel pipe measuring 56 in. in diam. and weighing 11 tons each.



# NEWS of the AUTOMOTIVE INDUSTRIES

nage is 4.37 per cent less than the record 1947 consumption of 1,122,327 tons, but is higher than the 1,039,296 tons consumed in 1946, and is far in excess of the 781,259 tons used in the record pre-war year of 1941.

## Postwar Automobile Changeover Cost Nearly \$400 Million

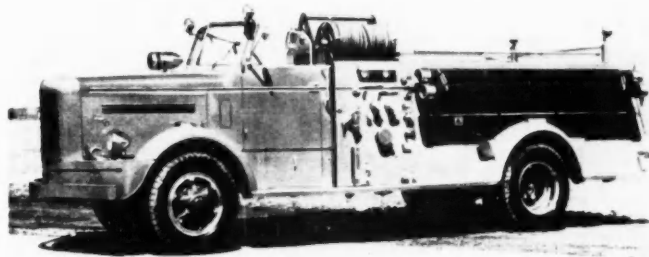
The total expenditures by the automobile industry for the changeover to the production of postwar cars is estimated at nearly \$400 million. A breakdown of this estimated total is as follows: General Motors, \$150 million; Chrysler, \$90 million; Ford, \$90 million; Packard, \$20 million; Hudson, \$16 million; Studebaker, \$16 million; Nash, \$15 million.

## GM Engineer Says Trend Is to Torque Converter

O. K. Kelley, GM transmission development engineer, read a paper before SAE in Detroit during the Annual Meeting, which said specifically that the torque converter in one form or another looks like the coming transmission in a great number of American automobiles. It is generally known that there is a definite trend in the industry toward the torque converter-type transmission. Chevrolet and Packard both have this type practically ready for production, and Borg-Warner is known to have one under development and nearly ready for production for companies that request it.

## Security Benefits Double for K-F Workers

Increased sickness and accident disability benefits went into effect for



## FWD FIRE FIGHTER

One of four new basic FWD fire engine models, all of which have a 160-in. wheelbase, this unit, the F-100-T, pumps 1000 gpm. An open or closed type of cab is optional on all of these engines, recently announced by the Four Wheel Drive Auto Co.

Kaiser-Frazer workers Feb. 1. The greatly liberalized payments are the result of a social security fund, first of its kind in the automobile industry, established last June by agreement between the company and the UAW-CIO. The fund is financed by payments of five cents an hour by the company for each hour worked by eligible employees. The previous maximum payment of \$15 weekly for 13 weeks has been doubled to \$30 a week for 26 weeks for sickness or accident disability. In addition, the fund also provides each eligible employee with free \$2000 life insurance and Blue Cross hospitalization and surgical service. Benefits similar to those given hourly-rated employees are available to non-union salaried and hourly-rated em-

ployes from a separate fund administered solely by the company.

## Wright Delivers New Engines for Douglas Super DC-3

The Wright Aeronautical Corp., engine building division of the Curtiss-Wright Corp., has delivered the first two of a new and more powerful nine-cylinder aircraft engine, designated the Cyclone 9HE, to the Douglas Aircraft Co. Said to increase the speed of the newly-planned Douglas DC-3 transport airliner by 25 per cent and to lower its operating costs by 11 per cent, the first two of Cyclone 9HE's are for installation tests in the new version of the DC-3 called the Super. The Cyclones will reportedly add 45 mph to bring the new DC-3 Super's speed up to 234 mph, and will increase the allowable gross weight from 25,200 lb to a 27,300, enabling the airliner to carry 28 passengers instead of the 21 provided for in the current DC-3 type.

## Collyer Sees End of Man-Made Rubber Pooling Agreement

John L. Collyer, president, the B. F. Goodrich Co., recently stated that he may soon expect the end of government-sponsored patent pooling agreement in the man-made rubber field. He revealed that the major rubber companies and other parties to the agreement have already agreed on the terms of an arrangement for the return to free competition. It now only remains for the Canadian government, which has a similar wartime agreement, to concur in that arrangement. Mr. Collyer ex-



## POWER BY ROCKET

Available in six body styles, Oldsmobile's new 1949 Series 88 Futuramic model is powered by the new high-compression Rocket engine. With a wheelbase of 119½ in., and an overall length of 202 in., the new Series 88 will offer GM's Hydra-Matic Drive as standard equipment.



# NEWS of the AUTOMOTIVE INDUSTRIES

## 1948 SHIPMENTS OF CIVIL AIRCRAFT AND AIRCRAFT ENGINES AND OTHER PRODUCTS OF THEIR PLANTS\*

	November	October	Eleven Months
Civil Aircraft	317	502	7,067
Personal Planes:			
Number	294	476	6,930
Value	\$ 1,304,650	\$ 2,219,670	\$ 29,186,790
Transport Planes:			
Number	23	26	237
Value	\$ 9,493,303	\$ 6,187,125	\$ 77,523,922
Aircraft Parts - Value	\$ 1,185,753	\$ 2,067,110	\$ 20,356,164
All Other Products - Value	\$ 2,012,532	\$ 1,709,818	\$ 26,776,272
Total - Value of Civil Aircraft, Parts and Other Products	\$10,079,526	\$12,183,723	\$153,848,068
Civil Aircraft Engines:			
Number of Engines	193	220	7,728
Value of Engines	\$ 1,169,904	\$ 787,120	\$ 28,678,969
Value of Engine Parts	\$ 2,036,197	\$ 1,720,481	\$ 22,254,894
Value of All Other Products	\$ 113,382	\$ 111,138	\$ 1,777,943
Total - Value of All Products of Civil Aircraft Engine Plants	\$ 3,319,483	\$ 2,618,739	\$ 52,710,906

\* Bureau of the Census and Civil Aeronautics Administration.

plained that the action now being taken is made mandatory under the Rubber Act of 1948 which directs that exchange of patent rights and technical information during the wartime agreement be discontinued.

### Bendix Net for Fiscal 1948 Over \$11 Million

The Bendix Aviation Corp. had a consolidated net income for the fiscal year ended Sept. 30, 1948, of \$11,280,742, and sales of \$162,495,665, as contrasted with a net income of \$5,248,999 and sales of \$141,625,820 in the comparable period for the preceding year. New braking units, carburetors and fuel system, vacuum gear-shifting mechanisms, and a new hydraulic system for tractors and implements were among the items cited in the report as accounting for automotive product sales of about \$60 million for the 1948 fiscal year. During the year, the company spent approximately \$4.1 million for additions to manufacturing facilities. This brought to about \$19 million the amount expended for this purpose in the three-year period since the end of the war.

### Vauxhall Plans to Sell 2500 Cars in Canada in 1949

Vauxhall Motors, GM subsidiary in England, has complete arrangements to enter the Canadian market. It is planned to export 2500 Vauxhall cars to Canada this year, where they will be marketed by GM of Canada, Ltd., with 33 dealers in 24 big cities. Up to the present, 60 Vauxhalls have been sold in Canada, and 170 were shipped in January.

### GM Officials Honored For War Production

Four GM executives have been awarded the President's Certificate of Merit in recognition of individual industrial accomplishment during the war. They are O. E. Hunt and Harlow H. Curtice, executive vice presidents; Edward F. Fisher, a member of the board

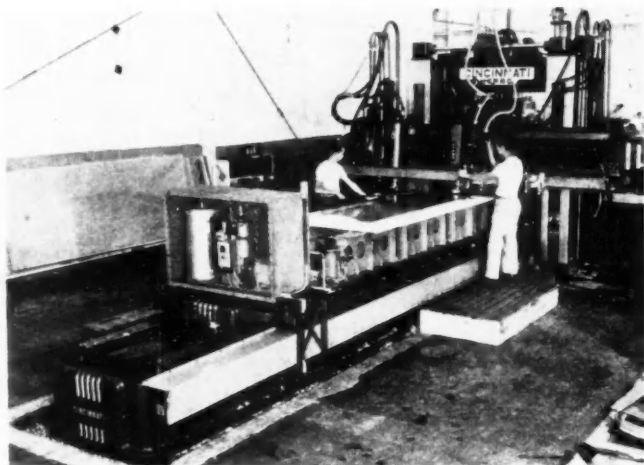
of directors; and Hugh Dean, manufacturing manager of Chevrolet. Mr. Hunt's citation was for his contribution in the manufacture and production of aircraft engines and parts at Buick, where he was general manager. Mr. Fisher received the citation as general manager of Fisher Body Div. during the war which produced major assemblies for bombers and aircraft flight instruments. Mr. Dean received his citation for his direction of manufacturing mass production of aircraft engines at Chevrolet.

### Minneapolis-Moline Planning Merger and Name Change

The Minneapolis-Moline Power Implement Co. has announced plans for merger into a wholly-owned Minneapolis subsidiary. Under the merger plan, business would be carried on by a Minneapolis corporation under a new name, Minneapolis-Moline Co.

### Small War Orders Dribble Into Automotive Industries

Slowly but steadily war contracts are seeping into the automotive industries. GM's Allison Div. will start next Sep-



### WING MILLING

North American Aviation, Inc. is using this Cincinnati Hypo planer-type mill to taper wing skins for the USAF F-86 jet fighter. The wing skins are milled to meet the exact stress requirements of each particular section. The working area is covered by a crane way which has vacuum lifting devices consisting of a triangle-shaped frame provided with three vacuum cups. A small vacuum pump and motor are located on top of this frame. In operation the vacuum cups are lowered against the sheet, the vacuum pump turned on, and when it has reached 27 in. of mercury, the sheet may be quickly and easily lifted to the next operation.

# NEWS of the AUTOMOTIVE INDUSTRIES

tember on a contract for the production of a new torque converter-type transmission for General Patton-type tanks. The amount of the contract is \$40 million, which includes an unspecified amount for tooling costs. Peak production is expected by early next year, and will amount to about 100 transmissions a month. It is also reported that International Harvester is the prime contractor on a proposed tank order which is to be announced in the near future. Superhydraulic Corp. of Detroit has announced that it is expecting contracts from the Detroit Ordnance district and from Wright Field for its hydraulic pumps and valves. The amount of these projected orders has not been revealed, but it indicates that a start is being made in allotting defense work to the industry.

## Ford Program Gives Foremen Authority

Ford is finding that its experimental program at its Highland Park plant which gives foremen the right to discipline employees directly is working out well. Previously all disciplinary action was handled by the labor relations staff, but under the new plan which is designed to give foremen increased responsibility, they are hearing the disciplinary cases themselves and are deciding what penalty to apply within terms of the contract. Any cases that are appealed are handled by the labor relations office, which also advises foremen on disciplinary problems at their request.

## President Grants \$109 Million to Buy Jet Aircraft

A total of \$109 million has been approved by the President for the purchase of approximately 158 jet fighter aircraft and a number of trainers. This money is available because of the reallocation of funds previously earmarked for the purchase of aircraft for which present requirements are less urgent. The new airplanes certificated include approximately 48 Northrop F-89 all-weather jet fighters; 110 Lockheed F-94 all-weather jet fighters converted from the TF-80C; and a number of trainers, whose type has not been determined.

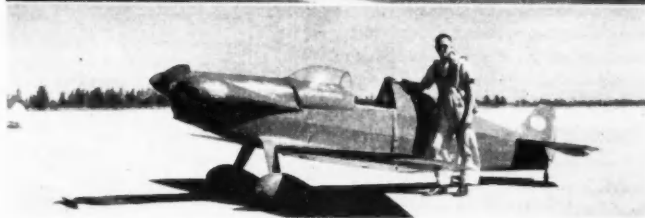
## Auto-Lite to Operate New Plant in Hazleton, Pa., by May

The Electric Auto-Lite Co.'s newest wire plant at Hazleton, Pa., will be in operation by May, Royce G. Martin, president, stated recently.

## More Engine Tests Urged To Develop Lubricants

Although great progress has been made in development of lubricants for automotive use, more engine service tests to produce better quantity crankcase oils are needed by both the

light or intermediate service; (2) effect of the oil on formation of combustion chamber deposits which may have a bearing on anti-knock requirements; (3) effect of the oil on exhaust valve burning; (4) effect on spark plug life; and (5) rate of oil consumption as effected by formation of deposits in the engine



## TOP THREE MIDGETS

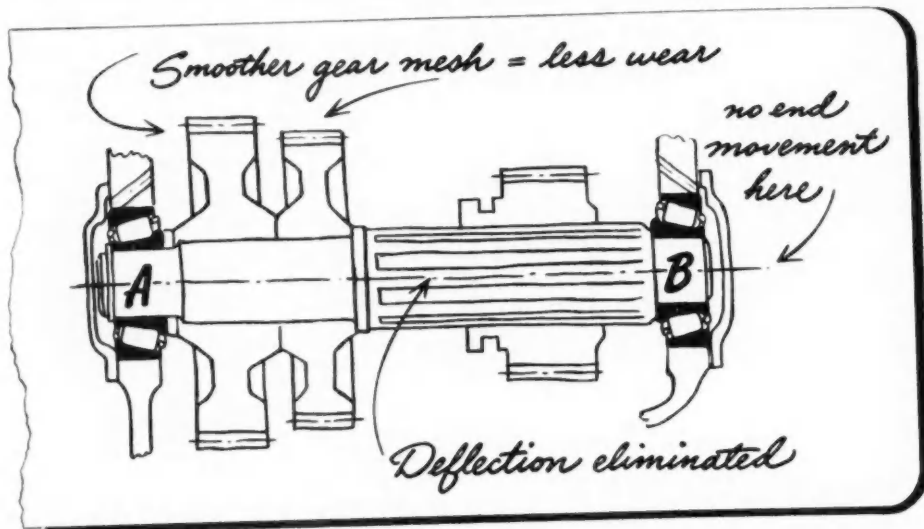
Shattering all previous midget plane racing records, Steve Wittman piloted his new Wittman Special (top) at an average speed of 176.867 mph to win the 1949 Continental Motors Trophy Race recently in Miami. Flying at an average speed of 174.193 mph Bill Brennan (middle) won second place. Both planes are owned by Wittman, and are powered by 85-hp Continental engines. Ted Heisel flew a Pitts Special (bottom) at an average speed of 170.011 mph to win third place.

automotive and petroleum industries, according to H. C. Mougey, technical director of General Motors Research. He said that although engine tests are costly, they are the only real way to find out how an oil will stand up in service. He added that there are not generally recognized tests to evaluate oils in many respects and that tests are needed to determine: (1) ability of oil to decrease wear of engine parts in

and by ring and cylinder wear caused by corrosion.

## USAF Instructs Northrop to Build 48 F-89 Jets

The USAF has instructed Northrop Aircraft, Inc., to proceed with preparations to produce 48 F-89 all-weather jet (Turn to page 58, please)

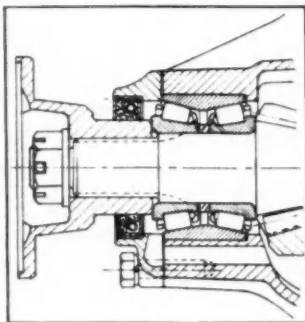


## A long life—and a happy one—for your automatic transmission

**A**UTOMATIC transmissions last longer and work better when the countershaft is mounted on Timken® tapered roller bearings. Timken bearings hold the shaft in rigid alignment—eliminate deflection and end-movement. Gears mesh more smoothly. There's less chance of wear—more years of quiet, trouble-free operation.

Due to their tapered design, Timken bearings carry both radial and thrust loads in any combination. Because they eliminate the need for separate thrust bearings or washers, designs can be simplified. And since Timken bearings permit precise adjustment during installation, there can be wider machining tolerances in surrounding parts.

They give you the four things you need most in your automatic transmission: smoothness of operation; quietness; long life; low cost. **LOOK AT STRADDLE PINIONS FOR EXAMPLE** . . . Here's a typical application in



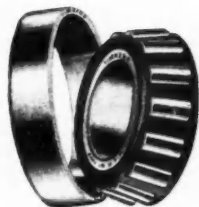
which Timken bearings keep pinion and gears in rigid alignment despite heavy torque and tough radial and thrust loads. Wheels,

steering parts, and differentials are other applications where Timken bearings insure long, dependable performance.

The Timken Company has worked hand in hand with the automotive industry for almost 50 years. Our engineering facilities are available to help you plan new bearing applications. In Detroit, phone TRinity 5-1380. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

**NOTE TO P. A.'s** Because every step of the manufacture of Timken bearings is controlled within our company . . . because our vast manufacturing facilities are widely dispersed . . . you will find the Timken Company a supply source of outstanding reliability.

**TIMKEN**  
TRADE MARK REG. U. S. PAT. OFF.  
**TAPERED**  
**ROLLER BEARINGS**



NOT JUST A BALL  NOT JUST A ROLLER  THE TIMKEN TAPERED ROLLER  BEARING TAKES RADIAL  AND THRUST  LOADS OR ANY COMBINATION 

# Further Decline in Strikes

## Under Taft-Hartley Act As Demand for Repeal Continues

By Karl Rannells,

Washington Bureau,  
AUTOMOTIVE INDUSTRIES

### WORK STOPPAGES DURING SELECTED YEARS 1919-1948

PERIOD	Number of Stoppages	Workers Involved (thousands)	Man-Days Idle	
			Total (thousands)	Per Worker Involved
1948 (A)	3,300	1,950	34,000	17.0
1947	3,693	2,170	34,600	15.9
1946	4,985	4,600	116,000	25.2
1945	4,750	3,470	39,000	11.0
1944	4,956	2,115	8,721	4.1
1941	4,288	2,362	23,047	9.8
1939	2,613	1,170	17,812	15.2
1937	4,740	1,860	28,424	15.3
1935	2,014	1,117	15,456	13.9
1933	1,695	1,168	(B)	(B)
1931	810	341	(B)	(B)
1921	2,385	1,100	(B)	(B)
1920	3,411	1,460	(B)	(B)
1919	3,630	4,160	(B)	(B)

Source: Bureau of Labor Statistics, Department of Labor.  
(A) Preliminary estimates. (B) Not available.

ANTAGONISTS of the Taft-Hartley Act claim that it has failed to reduce labor disturbances and demand its immediate repeal, while at the same time legislators are introducing repealers in Congress that they hope will meet the favor of labor union leaders. With all this effort by pressure groups, it seems unlikely that the issue will be decided on its merits, but rather on political expediency.

Nevertheless, the Government's own statistics show that not only were there fewer strikes in 1948 but fewer workers were involved and less time lost from production lines than in any years since the beginning of the final war year of 1945. About 3300 work stoppages due to labor-management disputes occurred during 1948, according to preliminary figures of the Bureau of Labor Statistics.

Despite 20 large strikes—including the bituminous shutdown, the short Chrysler walkout, and the packing house strike—slightly less than two million workers went on strike last year. The figure was 2.2 million in 1947 and 4.4 million in 1946 last year of the Wagner Act.

Without taking into account indirect idleness caused by shutdowns, approximately 34 million man-days were lost in 1948 by workers at striking plants, mines, etc. The 1947 figure was 34.6 million; in 1946, it was 116 million.

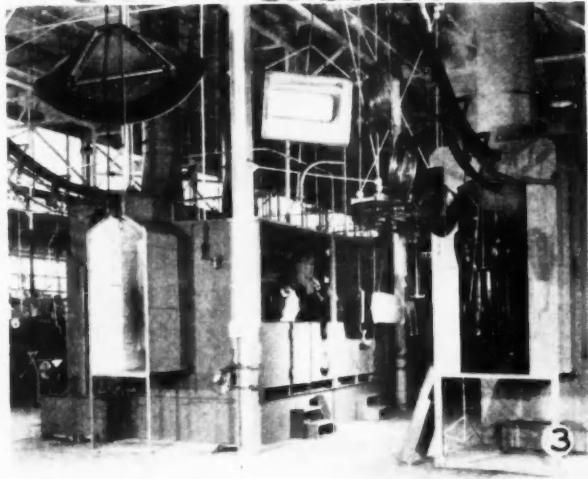
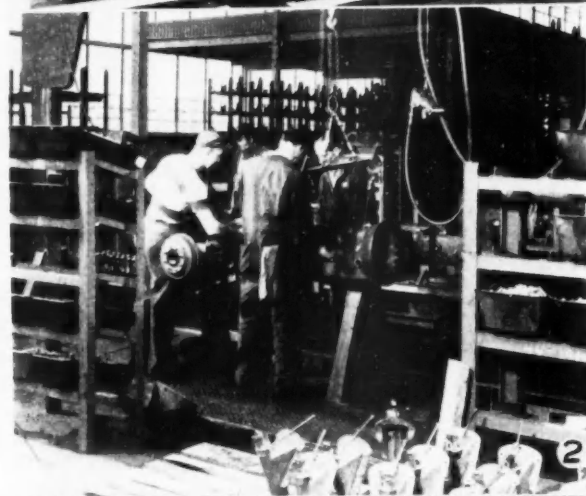
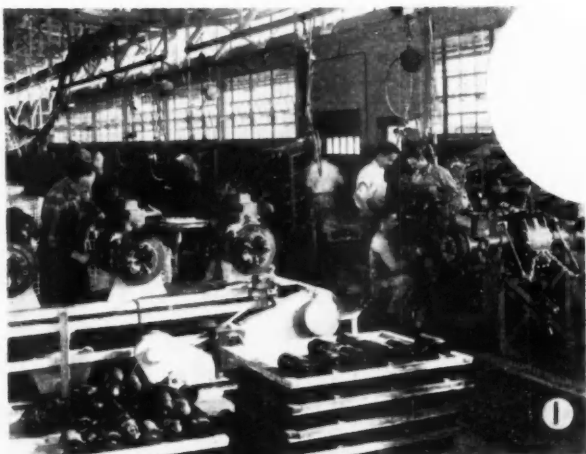
Glancing back over 1948, the BLS figures the drop in the total number of strikes at about 10 per cent. This alone is not necessarily a reliable measuring stick since there were 20 large strikes (10,000 or more workers) last year as compared with only 15 in 1947.

(Turn to page 96, please)

### MAJOR AUTOMOBILE, AIRCRAFT AND RELATED WORK STOPPAGES in 1948

Beginning Date	Approximate Duration	Establishment	Unions Involved	Workers Involved
March 22	2 days	Hudson Motor Car Co., Detroit, Mich.	UAW (CIO)	13,000
April 7	4 days	Goodyear Tire & Rubber Co., Akron, Ohio (Plants 1 & 2)	URCL & PW (CIO)	10,000
April 22	142 days	Boeing Airplane Co., Seattle, Wash.	Aero Mech- anics, aff. with IAM	18,000
May 12	17 days	Chrysler Corp., Detroit, Evansville, and Maywood, Calif.	UAW (CIO)	75,000
Sept. 8	16 days	Briggs Mfg. Co., Detroit, Mich.	United Guard Workers	25,000
Nov. 9	4 days	Chrysler Corp., Detroit, Mich.	UAW (CIO)	13,000

SOURCE: Bureau of Labor Statistics, Department of Labor. Not listed above is the oil refinery strikes involving 17,000 workers of the Oil Workers Int. Union (CIO). They began September 4 and first settlements with individual companies were reached about November 4 and others later. As of January 1, about 1600 workers were still on strike.



# Palletizing Ferguson

**T**HE new venture of Harry Ferguson, Inc.—builder of farm tractors—recently previewed in Detroit, is an outstanding example of what advanced production planning can do with the basic operation of final assembly. The new plant on Southfield Road in Detroit boasts a modernly styled factory building 680 by 240 ft on a property embracing some 72 land acres. This plant with its facilities represents an investment of \$3 million. The total investment—including the assembly plant, and tooling for the transmission, rear axle, and other components—runs around \$10 million for all concerned.

Operations fall logically into three major activities—materials handling, sheet metal cleaning and painting, and final assembly. Materials handling is easily the clue to the efficient operation of this plant and is interwoven with every function from start to finish. While it is natural to find conveyerization the key to final assembly and movement through the paint lines, the major aspect of the materials handling system is the accent on the palletizing technique. One of the brightest ideas

**1.** First stage of the Ferguson tractor assembly line showing the backbone being built up. In the background may be seen the monorail conveyor on which the backbone is lifted for the trip through paint and drying and then to the final stage of assembly. In the foreground at the left is one of the major sub-assembly feeder lines—the engine, which carries engines to the final line at the point of installation.

**2.** Here is the start of the initial stage of final assembly with rear axle and transmission sub-assemblies being mounted on the assembly fixture. These units feed in from the sub-assembly conveyor which may be seen in the center background.

**3.** A view of the sheet metal paint department showing movement of the variety of detail parts on the closed monorail conveyor system. One of a number of Schmiege water curtain paint spray booths is at the left.



# Has Important Part at Tractor Plant

evolved in current practice, at Ferguson it is employed without exception in the handling and storing of all parts, and assemblies such as engines, transmissions, and rear axles.

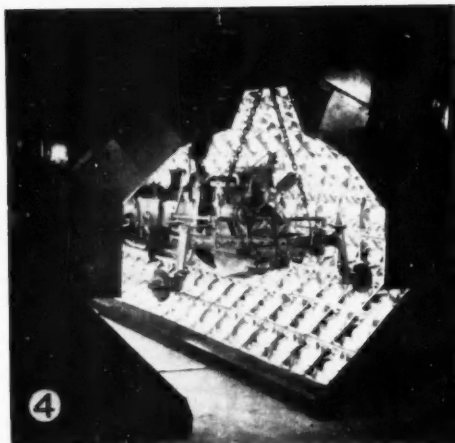
The massive units such as engines, transmissions, and axles are shipped and stored in specially designed structural steel racks which are arranged for ease of stacking in tiers. Wherever convenient, other parts are transported and stored in wire containers. The latter are of special design and made easily collapsible so as to take but little space when shipped to suppliers. The important point is that all suppliers are required to use the standard racks or containers when making shipments to Ferguson. And the parts remain in these containers while in transit, during storage, and in delivery to the assembly line.

Unloading of incoming shipments is handled by a fleet of Clark lift trucks—unloading trucks and freight cars and dispatching to the storage bays. Several large capacity, high-lift Towmotor trucks are employed for high level tiering so as to take advantage of the space above the floor. The Towmotor unit has a lift of 12 ft, making it possible to tier three and four rows high.

Coming to assembly, we find a straight line in three major sections, running 600 ft in overall length. The first section is a floor level, power driven conveyor on which is integrated the primary backbone of the tractor—the rear axle, transmission, and engine. At the end of this section is a loop of heavy duty monorail conveyor which lifts the backbone off the assembly line, transports it through the enamel spray booths, through the infra-red drying tunnel, and delivers it to the final assembly conveyor at the other end.

As illustrated, Ferguson uses the well known Schmieg water curtain spray booth on the final line, drying being handled in a 70-ft Fostoria infra-red tunnel fitted with gold-plated reflectors.

**5** Materials handling contributes greatly to mechanized movement of materials as well as considerable space economy. One example of this is the tiering of engines and other major parts by means of the high lift Towmotor truck shown in action here.

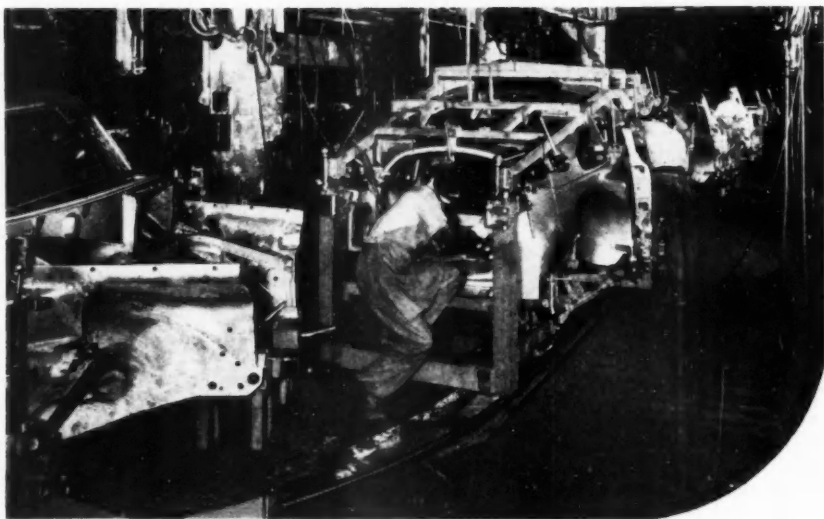


**4** Two large Fostoria tunnel type infra-red drying ovens are employed in this plant. This view shows the 70-ft Fostoria oven mounted on the floor for drying the complete tractor backbone as it emerges from the Schmieg spray booths.

Paralleling the main paint line is another paint line for component sheet metal parts—fenders, hoods, etc. Here the parts travel on a closed monorail conveyor about 922 ft in length, through an Industrial solvent

(Turn to page 70, please)

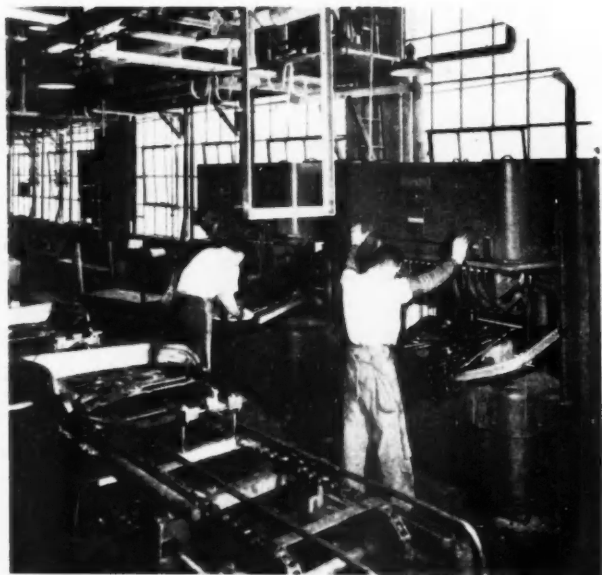




After the turn on the body assembly merry-go-round, here is the point at which the roof section is clamped securely and accurately for welding to the body proper. The massive framing fixture for this operation is suspended from the ceiling and dropped onto the body.

## Simplified Body Design *Contributes to*

By Joseph Geschelin



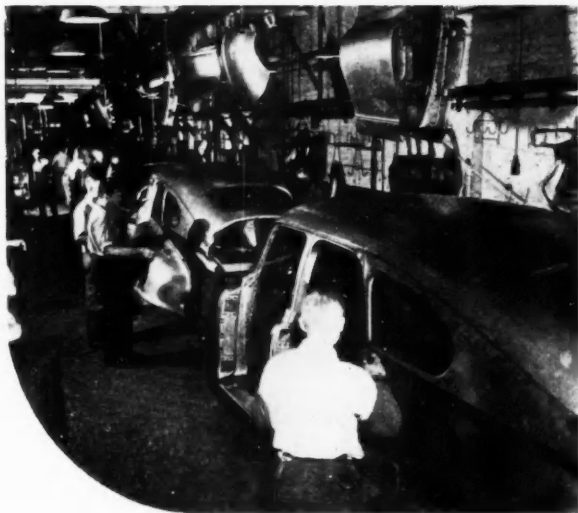
**I**N A preliminary report entitled "Nash Prepares for 1949 Production" (see *AUTOMOTIVE INDUSTRIES*, July 15, 1948) we outlined some of the details of changeover at the Milwaukee plant for the new models which since have been announced by Nash. Among other things we touched on the installation of new batteries of Bliss and Clearing presses, some new Ultra-Speed Federal multi-spot welding presses, and an impressive change in the layout and extent of conveyors and materials handling devices.

Through proper coordination of engineering design and the requirements of production economy, the 1949 Nash bodies contribute importantly to a simplification of operations. Since the major parts—with the exception of the underbody—are interchangeable for the same type body throughout the line, the

The door assembly line begins with detail welding on the door inner panels, this being done in a battery of four Expert multi-spot welders, two on each side of the conveyor in the center. This conveyor leads the inner panels through the assembly operations in the background and finally to the assembly of inner and outer door panels.

*As the bodies move to the metal finishing operations, it will be seen that the rear fender is applied as shown and spot welded to the rear quarter panel.*

Nash Reduces Number of  
Different Stampings Neces-  
sary by Making Many Parts  
Interchangeable for Various  
Body Types



## Production Efficiency

number of different stampings has been reduced and the problem of handling and storing thus simplified.

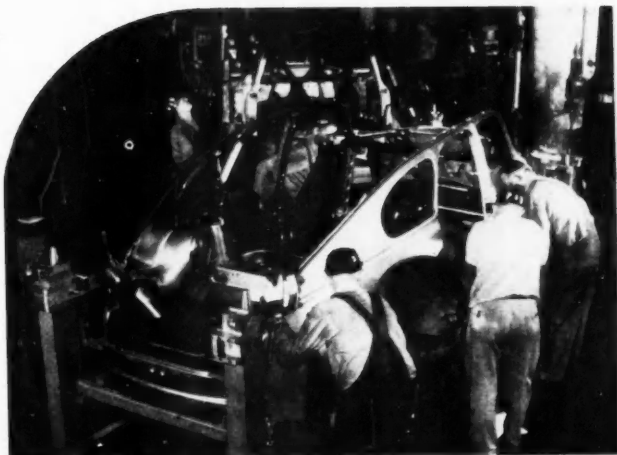
An ideal approach to the body soldering problem has been achieved with the new models. Body solder always has been a headache because of the cost of the operation, the need for specially trained workers, and more recently because of the shortage of solder. 1949 Nash bodies have only two soldered areas—one on each side of the rear quarter panel just below the end of the drip molding. Each soldered seam is only about two in. long.

Just as a matter of record the 1949 four-door sedan body for the 112-in. wheelbase cars has a total of 7824 spot welds. The 121-in. wheelbase models have 8001 spot welds, the difference being in the extra number of welds required for the longer underbody.

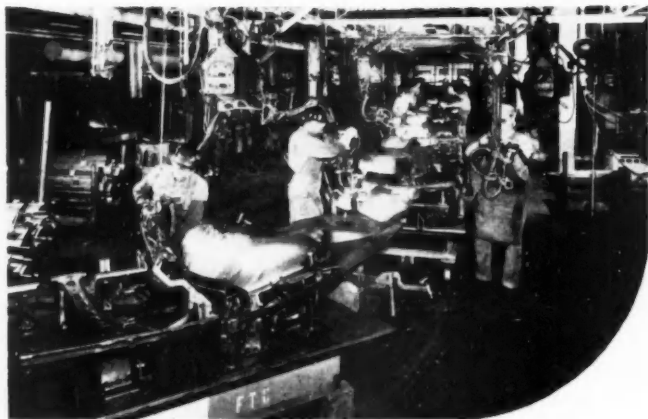
Body assembly begins with the completion of the underbody assembly. To the underbody sub-assembly—consisting of the floor pan and integral frame—is added the dash assembly which is prepared in the

big Federal multi-spot welder near the start of the assembly line. The assembly is completed in a series of welding operations over four stations, including the welding of the deck lower center panel, the rear seat riser, floor pan brace assembly, filler neck cover, shock absorber housing, seat adjuster spacer, and various brackets.

The Unisides, the roof panel, and complete body



*Final body assembly on the merry-go-round begins with the installation of the underbody and dash assembly unit and the addition of Unisides at this station.*



Typical of the merry-go-round conveyor lines is the one shown here for the assembly of Unisides.

assembly are handled on large merry-go-round conveyors. The Unisides are built on two lines—one for right side panels, the other for left side panels, each one having 19 fixtures. The assembly is built up starting with the side quarter panel, roof rail assembly, side sill apron assembly, center pillar, and front pillar assembly. These sections are spot-welded together to form the basic Uniside, other parts and attachments being added at succeeding stations. For example, later on are added the side sill, side quarter window frame assembly, side quarter arm rest support, and other parts.

In the case of all major assemblies described here, it is understood that sub-assemblies are made up in special fixtures and delivered on conveyors to the specific assembly line for integration with the major assembly.

The roof panel is the largest individual stamping of the Nash unitized body and doubtless one of the largest in the industry. Certainly it is interesting in that the single panel is drawn to include the entire cowl upper panel, windshield opening, and the rear section including the entire rear window opening. Again profiting by coordination of engineering design and production economy, the roof panel is made interchangeable in major respects for both two-door and four-door models.

Roof panel assemblies are built on a big merry-go-round conveyor having nine fixtures. Briefly, the roof panel stamping

has added to it the drip molding on both sides, and windshield header bar assembly. All of the joining is by spot welding, requiring 290 welds on the average.

The basic assembly of the complete body is done on two merry-go-round conveyors fitted with 32 massive framing jigs designed to facilitate accurate positioning of component sub-assemblies, holding the various parts securely in place so as to assure accurate alignment. Essentially, the complete assembly

is made up of the major sub-assemblies described above—the underbody, two Unisides, and roof. To these major parts, constituting the shell, are added a variety of smaller sub-assemblies, brackets, attachments, etc. As bodies approach the end of the line, the roof assembly is installed. This is fitted accurately and held securely by means of an overhead-mounted roof fixture. The one used this year is considerably simpler and easier to handle than previous versions.

It may be noted that wherever sub-assemblies are added to a major assembly such as those described above, the contacting surfaces are coated with a welding primer to inhibit corrosion at points not reached later by Bonderizing.

When body shells reach the last station on the assembly conveyor they require a considerable amount of additional detail welding for completion. Owing to the amount of such operations the body shells are transferred onto two long conveyor lines which lead to the body-in-white department. This starts with an elevated section to facilitate underbody welding at a convenient working height, then drops to floor level and travels on what is called the "snake" line because

(Turn to page 85, please)

Here is the other end of the door assembly department. At the extreme right, somewhat out of the view, the inner panel assemblies are removed from the chain conveyor and fitted to the outer panel on the belt conveyor seen in the foreground. Inner and outer panels are joined by welding in one of the six big Federal multi-spot welders at the left.



# 5-W Engine Oil

## Likely Answer to Sub-Zero Operation

**S**INCE the operation of automobiles during winter months is a rugged experience in Canada and the extreme northern belt of continental United States, some prominent motor vehicle manufacturers decided it was time at least to ease the problem of starting, to assure quicker starts with less drain on over-worked batteries. For almost 15 years the practice has been to use 10-W engine oil with the addition of 10 per cent kerosene for temperatures below  $-10^{\circ}\text{F}$ .

During the winter of 1947-48 a few Canadian dealers and petroleum distributors had their first experience with a new type of sub-zero engine lubricant, known as 5-W, and recommended in place of the 10-W kerosene mixture for temperatures below  $-10^{\circ}\text{F}$ . Following the initial introduction of 5-W oils in Canada, a large group of refiners and oil marketers made 5-W oils available this winter—1948-49—throughout the entire sub-zero winter belt, both in Canada and the U. S. A.

Why 5-W oils? In the absence of something better the 10-W kerosene mixture had done a good job for many years. Nevertheless, its use has a serious drawback. Kerosene evaporates during the normal running of an engine and since the rate of evaporation is quite variable it is difficult for the car owner to anticipate the loss. Moreover the ordinary car owner has no means of testing the crankcase charge to determine when to add kerosene or how much to add in safety. It is almost commonplace for a driver to go along for a period of time without starting trouble only to find it impossible to start some morning.

During the winter of 1946-47 Chrysler Corp. sent an engineering expedition to Bemidji, Minn., to observe sub-zero driving conditions, this time with special emphasis upon observations of field conditions and spot checking of crankcase lubricant viscosity. The general conclusions drawn from this experience were as follows:

1—That cold starting at extremely low temperatures is a major problem.

2—That the then current instruction

book recommendations of diluting 10-W with kerosene were not adequate to meet the situation. The main objection is that the mixture does not result in a stable lubricant with respect to the all important property of viscosity.

3—That kerosene, as such, is practically unavailable at service stations.

These findings confirmed the conclusions of expeditions made in previous years both by Chrysler and General Motors.

Realizing the need for action, E. W. Upham, chief metallurgist, Chrysler Corp., and H. C. Mougey, technical director, Research Laboratories Div., General Motors,

jointly presented a paper entitled "Sub-Zero Automotive Oils" at the SAE National Fuels & Lubricants Meeting in Tulsa, in November, 1947. This paper presented a complete report with all supporting evidence. It also supported the adoption of basic specifications recommended by a subcommittee of the SAE Fuels & Lubricants Technical Committee. In its August, 1947, report, this subcommittee recommended that the new lubricant should be of premium grade and possess high viscosity index properties. The viscosity limits should be such that the proposed oil would have about the viscosity at  $-20^{\circ}\text{F}$  that 10-W has at zero  $^{\circ}\text{F}$ . The suggested limits were 1800 to 3200 at zero  $^{\circ}\text{F}$ . Using these limits with oil ranging from zero VI to 100 VI, the maximum viscosity of any oil at  $-20^{\circ}\text{F}$  would be 12,000 and the mini-

(Turn to page 68)



# What Makes Hot Rod

By John Bond

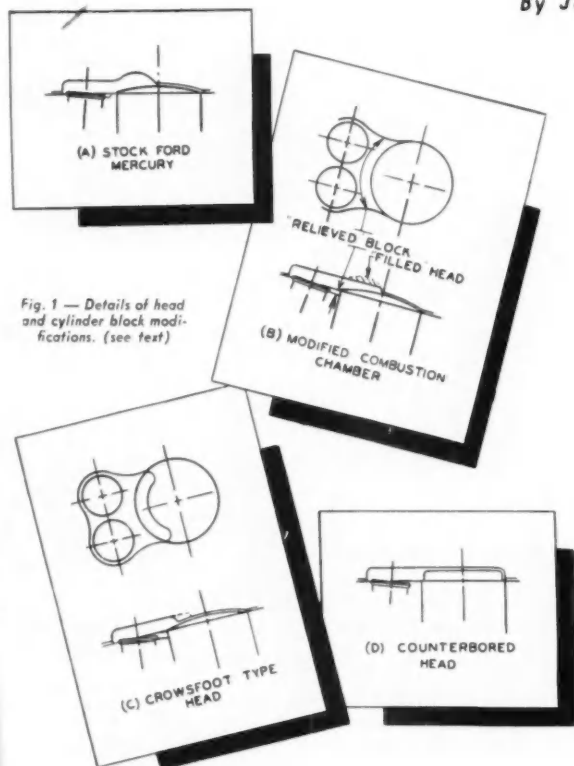


Fig. 1 — Details of head and cylinder block modifications. (see text)

back as the model T of earlier Fords.

The performance of a good hot rod is certainly noteworthy, as the following data will show:

Acceleration:

Standstill to 60 mph. . . . . 8 secs

Standing  $\frac{1}{4}$  mile . . . . . 15 secs

Speeds:

In 1st gear . . . . . over 70 mph

In 2nd gear . . . . . over 90 mph

In high gear

140.955 (stripped roadster)

In high gear 150.500 (race car body)

The speeds quoted are two-way record runs, electrically timed over a  $\frac{1}{4}$ -mile course by the Southern California Timing Association at El Mirage Dry Lake, Calif., during the past summer. Acceleration times given are, of course, attained by only a few very exceptional cars, but a large number of hot rods can come within 2 seconds of either figure. From the speeds attained, it is obvious that something over 200 bhp is developed by the powerplants in the fastest cars.

Modifications to the Ford V-8 engine, as used in 95 per cent of the cars, include the following:

1. Increasing the piston displacement.
2. Increasing compression ratio.
3. Improving volumetric efficiency.
4. Increasing the peaking speed.

Table I shows eleven combinations of bore and stroke which are most often utilized for the V-8; other combinations have given displacements of over 300 cu in. The most common and widely used bore and stroke combination is 3 5/16 in. by 3 7/8 in., which gives 268 cu in. displacement, an increase of just over 12 per cent compared to the postwar Ford 239 cu in. stock engine. A bore of 3 3/8 in. is occasionally found on prewar blocks which were originally of 3 1/16 in. bore. Usually, however, the 3 3/16 in. bore block is preferred, and with some selection for minimum core shift, little or no cooling troubles are encountered even though cylinder walls are only  $\frac{1}{8}$  in. thick.

The stroke increase of  $\frac{1}{4}$  in. is secured at low cost in the following manner. A late model Ford or Mercury crankshaft with standard 3 3/4 in. stroke has crankpins of 2.140 in. dia. This diameter is 2.000 in.

IN EUROPE, where "motoring" is still considered in the luxury category, the sports car is a popular type of automobile which has no counterpart in this country. That is, unless we consider the California "hot rod," or "souped-up" roadster — a sports car. Whether a hot rod is a sports car or not, the growing popularity of this type of car does indicate a demand for high performance automobile of the foreign sports type.

While a sports car has been defined as a racing car designed for use on the road, a hot rod virtually defies definition because no two are ever alike. However, a few typical hot rods are illustrated, most of them built around Ford components. The 1932 Ford 106 in. wheelbase Model 18 (the first Ford V-8) is by far the most popular with hot rod builders, but the roadster body is often taken from an older model, even as far



# Engines "Hot"

on 1932 through 1938 model V-8 crankshafts. By re-grinding the later model shaft to crankpin diameter of 2.000 in., and at the same time utilizing the .140 in. extra stock to increase the throw radius 1/16 in., the stroke is increased  $\frac{1}{8}$  in. to 3 $\frac{7}{8}$ . The earlier model rods and bearing inserts fit perfectly, and the piston pin hole of the special oversize piston is located 1/16 in. closer to the piston head to give the correct location at top dead center, since all connecting rods are 7.000 in. long center to center. Occasionally the head is counterbored to allow the piston to come up higher, in which case the piston pin hole is bored to standard location and the ring grooves are lowered.

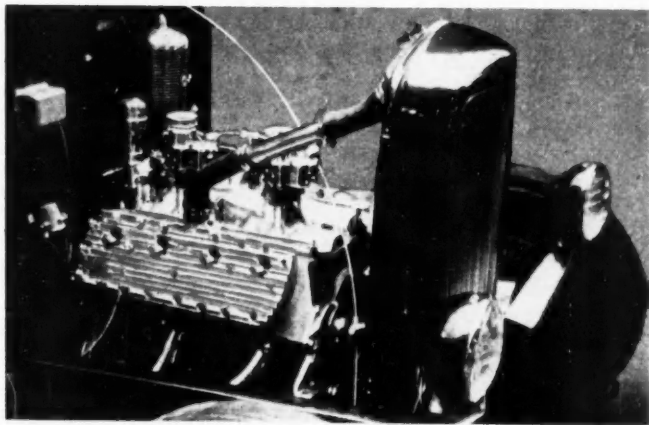
Pistol skirts on a "stroker" are also shorter for counterweight clearance at bottom dead center. Until the recent introduction of the 1949 Mercury with 4.000

in. stroke, stroke increases of over  $\frac{1}{8}$  in. were obtained by metal-spraying the crankpins. We already have "stroked" 1949 Mercury shafts in operation, secured in the same manner as described here, and giving 4 $\frac{1}{8}$  stroke.

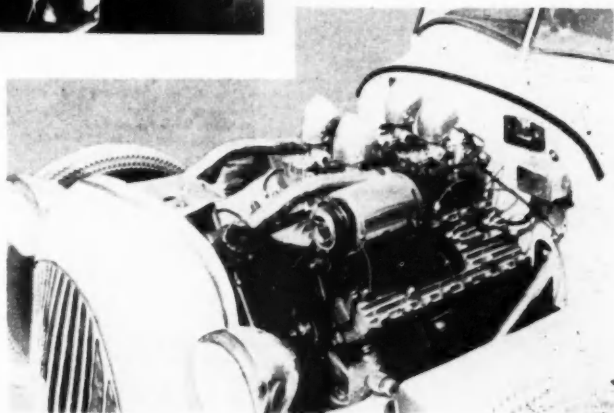
Compression ratios in L-head engines of much over 7.0 to 1 often show little or no improvement in peak horsepower, particularly with large bore, short stroke type engines. To utilize high compression without loss in volumetric efficiency, most of the twenty or more manufacturers of special heads for the V-8 recommend "relieving" the block. Nearly all L-head engines have the valves slightly inclined, to the cylinders, with the seat and adjacent area counterbored by the factory. This leaves an irregular ridge of metal on the top of the block surface which impedes gas flow from the

intake valve annulus into the cylinder. This is not serious with present day compression ratios, but the removal of this ridge to a depth of  $\frac{1}{8}$  to 3/16 in. and for a width nearly equal to the cylinder bore is a necessity with the small volume combustion chamber employed by hot rod engine builders. See Fig. 1A and 1B.

The problem of restriction through the transfer area of the L-head combustion chamber when compression ratio is increased has also been approached through revised piston head



Here are two Ford engines equipped with special exhaust headers and high compression cylinder heads. One engine is equipped with a low type dual intake manifold, the other with a four-carburetor L & S intake manifold and an offset generator.



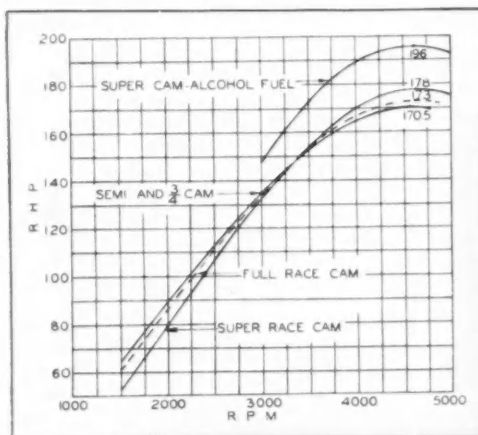


Fig. 2-A Brake hp curves by Edelbrock. Ford-Mercury engine bored, stroked, ported and relieved. Bore 3 5/16 in., stroke 3 7/8 in., displacement 268 cu. in. Two Stromberg No. 48 dual carburetors. Compression ratio nine to one. Run with two mufflers, no fan.

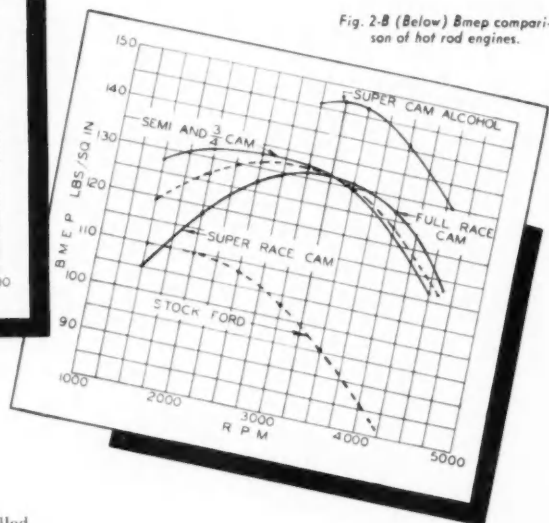


Fig. 2-B (Below) Bmep comparison of hot rod engines.

shapes. The small spherical dome of the stock Ford V-8 piston is obviously of some assistance and the same shape is used in nearly all of the 1/8 and 3/16 in. oversize pistons. A further improvement in breathing is secured in at least three makes of special heads by the so-called "crowsfoot" type of chamber as shown in Fig. 1C. This will be recognized as somewhat reminiscent of the General Motors Research head used on several cars around 1928 and 1929. Fig. 1D illustrates the counterbored head principle where a raised head piston enters and fills the counterbore, giving probably the ultimate in compression ratio possible with an L-head combustion chamber and still retaining ample breathing.

Actual compression ratios used in hot rods are some-

what vague, in view of variable piston displacement and amount of relieving, but, approximately, as high as 9.0 to 1 is used with 91 to 100 octane gasoline blends, and 12.0 to 1 with alcohol fuels.

Improved volumetric efficiency is also sought through "porting." As the term implies, it merely includes boring, filing, and polishing of the intake ports to a larger size. The writer believes this operation is useless unless accompanied by larger inlet valves. Porting is almost a universal practice but larger intake valves are not often found. Both intake and exhaust valves on the later Ford V-8 engines have a head diameter of 1.51 in. Valves of 1 1/4 and 1 3/4 in. diameter are available, the largest being usable only on the intake and requiring complete removal of the seat insert.

Almost any combination of valve timing desired is available from at least 15 different companies specializing in reground camshafts. Because of the low roof of the high compression heads, the usual approach to cam regrounding has been to maintain maximum lift at the stock .292 in., and to increase duration. The cam base circle is reduced so that the

TABLE I

Make	Bore and Stroke Inches	Displacement Cubic inches	Remarks
Ford-Mercury V-8	3 1/16 x 3 3/4	221	Stock 1932-42 passenger car
	3 1/16 x 3 3/4	239.4	Stock Mercury 1939-48; stock Ford 1946-49
	3 1/16 x 4	255.5	Stock Mercury 1949
	3 1/16 x 3 3/4	258.5	0.125 in. O/S bore
	3 1/16 x 3 7/8	268	0.125 in. O/S bore and stroke
	3 3/8 x 3 3/4	268.4	0.1875 in. O/S bore
	3 3/8 x 3 7/8	277	0.1875 in. bore - 0.125 in. stroke
	3 1/16 x 4	276	0.125 in. O/S bore - '49 Mercury crankshaft
	3 3/8 x 4	296	0.1875 in. O/S bore - '49 Mercury crankshaft
	3 1/16 x 4 1/8	285	0.125 in. bore - 0.125 in. stroke - Mercury crankshaft
	3 3/8 x 4 1/8	296	0.1875 in. bore - 0.125 in. stroke - Mercury crankshaft
Ford 6	3.3 x 4.4	226	Stock 1941-49
	3 7/16 x 4.4	245	0.1375 in. O/S bore
	3.5 x 4.4	254	1949 "industrial" engine
Chevrolet 6	3 1/2 x 3 1/4	216.5	Stock 1937-48 passenger car
	3 1/16 x 3 13/16	235	Optional truck 1942-48
	3 1/16 x 3 3/4	225	0.0625 in. O/S bore - passenger
	3 1/4 x 3 3/4	248.5	Wet-sleeved passenger car block
	3 1/16 x 3 13/16	244	0.0625 in. O/S bore - truck
	3 1/16 x 3 13/16	255	0.125 in. bore - truck

TABLE II

	Late Stock	Early Stock	Semi- Race	$\frac{3}{4}$ Race	Full Race	Super (Winfield)	Super (Harmon)	Super-H
I. O.	0"	9.5"	21"	23"	26"	24"	28"	30"
I. C.	44	54.5	59	62	64	68	67	78
E. O.	48	57.5	54	56	59	68	61	64
E. C.	6	6.5	16	19	21	24	24	26
Int. Dur.	224	224	260	265	270	272	275	288
Exh. Dur.	234	224	250	255	260	272	285	270
Overlap	6	16	37	42	47	48	52	56

new profile will clean up. Since the Ford barrel-type lifter has a diameter of 1.000 in., this also imposes restrictions on increasing the lift. Quite recently a new tappet of the mushroom type for the V-8 has made "high lift" cams possible and one make has a lift of .400 in. The mushroom tappet requires block machining for clearance, and is non-adjustable, but is made longer to compensate for the smaller base circle of reground cams. A barrel type lifter with a self-locking adjusting screw has been available since the war and has eliminated the need for brazing a shim to the stock Ford lifter to compensate for reground cams.

While reground cams vary somewhat with each supplier, common usage classifies the various types approximately in accordance with Table II for the Ford V-8.

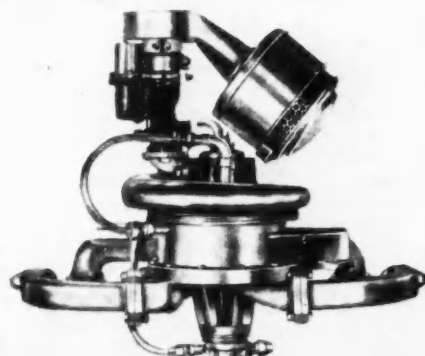
With Lincoln Zephyr valve springs used in place of the stock Ford-Mercury parts, the spring pressure at valve open position increases to 117 lb instead of 78 lb. These springs are interchangeable and permit speeds in the range of 7500 to 8000 rpm to be attained in low gear.

Multiple carburetors are "standard equipment" on all hot rods. Over 15 makes of manifolds are avail-

able and some makers offer several types. The most popular type uses two standard Ford dual carburetors with "low" risers spaced rather far apart. This necessitates moving the generator to one side over the cylinder head. The "tall" riser type usually has the two carburetors very close together so that the generator need not be moved. Manifolds are also available for three and even four dual carburetors.

For satisfactory ignition at high rpm several companies offer "converted" systems. These are worked units with double breaker points for two coils. Completely special distributors are also available, as well as several types of magnetos.

Nearly all hot rods seem to cool satisfactorily with-



Basasie turbo-supercharger for Chevrolet engines.

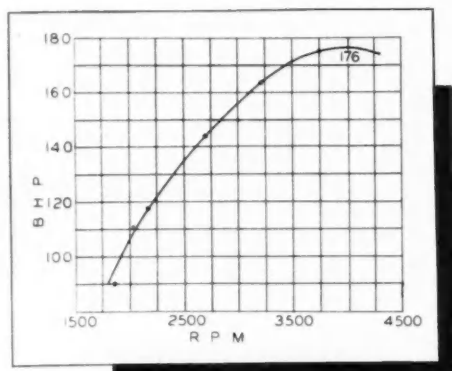


Fig. 3. Dynamometer test by Electronic Balancing Co. Ford-Mercury 59-A cylinder block 3 5/16 in. bore, 4 1/8 in. stroke, 284 cu in. displacement, with 1949 Mercury stroked crankshaft, Offenhauser heads and manifold, and Harmon & Collins super-race cam. Fuel—gasoline.

out the fan, though conditions are certainly helped by the practice of omitting the hood side panels to display the polished aluminum and chromium trim lavished on the engine. Exhaust headers in racing style welded tubing (also plated) are substituted for the stock castings and each bank carries its own exhaust system which may or may not be muffled. Quite a number of cars have a Y in each exhaust pipe system so that highway driving is done legally with mufflers, while at the speed trials, a plug can be removed to give minimum back pressure.

Flywheels are either turned down to about 18 or 20 lb or an aluminum alloy type substituted, some of which weigh as little as 10 lb. This change improves acceleration quite a bit with some sacrifice in idling characteristics.

Dynamometer test data are available on modified Ford engines and are quite interesting. Fig. 2A shows results of some extensive test work by Vic Edelbrock who manufactures heads and manifolds. The four

(Turn to page 74, please)

*Spirit of Enterprise Is Big Factor in*

*Speedy Rehabilitation of War-Ravaged*

*Plants for Passenger Car, Truck and*

*Engine Production*

## Italy's

By W. F. Bradley,

Special European Correspondent  
OF AUTOMOTIVE INDUSTRIES

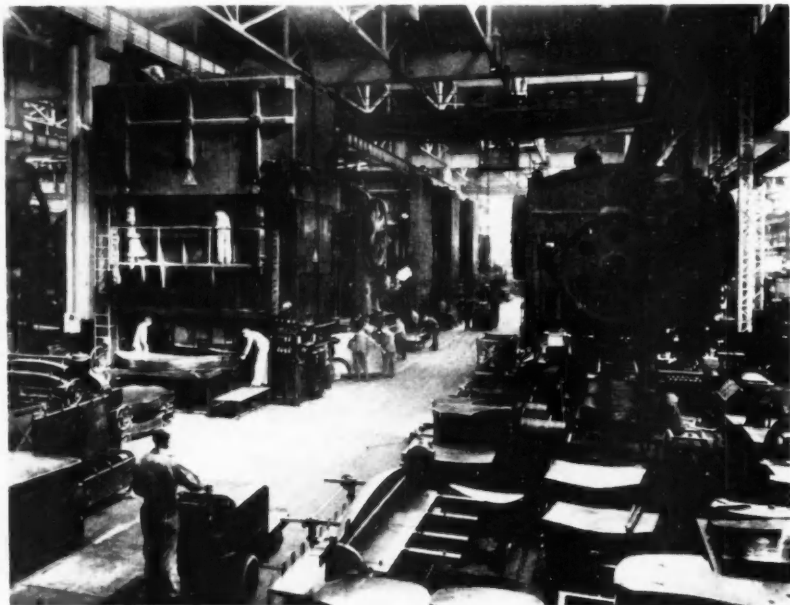
ITALY has staged a remarkable comeback that promises to make her an important factor in the world's automobile industry. Her position during the war was tragic in the extreme. As an enemy of the Allied powers she suffered heavily from aerial bombing. Her early attitude towards the United States showed itself later in big scale sabotage and when German forces were driven out, the Americans were welcomed as liberators.

Nearly all the war-damage to automobile plants has been repaired, and this work has been carried out by the Italians themselves, without government or outside assistance. Automobile production is not yet up to normal, but it is rising rapidly. In 1944 no automobiles were produced. Since then production figures, passenger cars and trucks, are: 1945—10,290; 1946—28,983; and 1947—43,736. It is estimated that the total production for 1948 reached the 60,000 figure.

Italy expects and will receive aid under the Marshall Plan. The main requirements are coal and steel, and machine tools for the rebuilt factories.

While there are persistent rumors of a link up with the American industry, an alliance of Fiat and Lancia with General Motors being openly spoken of, these are denied in Turin. An official statement from Fiat is to the effect that no such union is contemplated. It is admitted, however, that there had been some talks with Kaiser-Frazer, without any agreement

being reached. Lancia's reply is "this is a family business and it is going to remain in the family." Cisitalia, on the other hand, admits negotiations with the Argentine government and a program for building in that country (see July 15 AUTOMOTIVE INDUSTRIES, page 27).



Part of Mirafiori's large sheet metal presses, some of which are of American make.



General view of Fiat Mirafiori factory at Turin. It has an area of 74 acres and is one of the most modern plants in Europe. At the right is the test track consisting of two parallel straightaways and a banked loop at each end.

# Remarkable Comeback

There is a spirit of enterprise and enthusiasm in Italy which contrasts with the war-weariness to be found in some other European countries. Labor is not yet up to prewar standard but is improving, while disputes between labor and management have been satisfactorily low. Cost of living is high, but alleviation is being given by extensive social services. The Fiat Workers' Mutual Benefit Society numbers 60,000 workers, plus 100,000 members of their families. In addition to the Mutual Benefit Society, the Social Services Division comprises colleges and holiday homes, nurseries, farms, and recreation and sports clubs. In rebuilding its wrecked factory, Alfa Romeo put in modern kitchens and dining halls capable of providing two meals a day for the entire staff.

Production costs are too high. This is generally admitted and the next problem is to get them down to a competitive level. Government taxes have raised the cost of gasoline to 74 cents per American gallon, with the result that Italy is a country of small engines and Diesel-engined trucks. Efforts are being made to get fuel costs down, to assist in the development of the home market.

## Mirafiori Works in Production

Fiat, by far the biggest of the Italian automobile manufacturers, is now in production at the Mirafiori works on the edge of Turin. Only a few weeks before Italy entered the war, Mirafiori was inaugurated by Mussolini, but it was not at that time equipped for production.

At the end of the first world war the late Engineer Fornaco had designed the Fiat-Lingotto factory on the basis of vertical production—raw materials going in on the ground floor and finished cars emerging on the sixth floor roof test track. Composed of two buildings 1640 feet in length, with transverse buildings connecting the ends, Lingotto factory covered an area of 3,832,000 sq ft and formed an ideal target

for bombers. Doubtless this was realized when it was decided to lay out Mirafiori on the horizontal plane, with only the administrative offices having four stories. Lingotto was bombed on several occasions and severely damaged, but most of this has been repaired. The works are now being used for producing electric refrigerators and other domestic appliances under American license, and also bodies.

Mirafiori has a ground area of 247 acres, a covered area of 74 acres and a developed area of 118 acres. With minor exceptions it is used entirely for automobile production and employs 22,000 workers in two shifts. Damage through bombing was comparatively light, and with the exception of the iron foundry, practically all has been repaired.

It is stated that the damage suffered by the entire

## Fiat Establishments in Turin

	No. of Workers	Ground Area Acres
Mirafiori (automobile works)	22,000	247.0
Lingotto (special bodies, trucks, refrigerators)	6,118	90.0
Car & Truck Parts Factory	1,198	8.4
Turin Service Station	290	4.3
Non-ferrous Metal Factory	372	14.0
Metal Industry	96	3.0
Railroad	3,232	25.8
SPA Truck Factory	4,620	27.2
Airplane Factory	3,983	77.0
Metal Recuperation Plant	112	2.9
Iron and Steel Works	5,166	121.0
Iron Works & Metallurgical Plants	2,576	33.5
Iron Foundry	1,864	6.2
Marine Engine Works	4,640	16.1
<b>Total</b>	<b>56,269</b>	<b>676.4</b>



## Italy's Remarkable Comeback

*End of final assembly lines at  
Mirafiori plant.*

Fiat organization through bombing, looting and requisitions amounted to \$32,500,000 and the work of repair and restoration of buildings, plants and machinery is now virtually completed. The cost of this reconstruction up to the end of 1947 was \$26,000,000. Of this Fiat paid better than \$17,900,000 out of its own funds as State indemnities for war damage have so far been very small.

The shortage of raw materials and a reduced supply of electric current have restricted Fiat production. Reliance is placed principally on hydro-electric power. During the past two seasons the amount of snow falling in the nearby Alps has been unusually low and the summers have not been sufficiently warm to melt the snow on the higher peaks. Further, under peace conditions, France took possession of the Mount Cenis hydro-electrical station which supplied a vast quantity of current to the town of Turin. A revision of the frontier line here seems possible. In consequence of this, Mirafiori is not all electric. The power plant consists of five boilers, three oil fired and two coal fired. The steam is used to generate a large proportion of the required electric power which is supplied by three turbo alternator sets, two high and one low pressure. In addition, as a standby there are two Fiat-built Diesel generating sets of 5000 hp each.

Fiat production is over 200 units per day—passenger cars and trucks. This is below prewar level, but is gradually increasing, and is likely to rise rapidly during the next six months after new machinery is installed. Fiat has a renewed plant to a greater extent than other Italian makers, but more machinery is required and is expected to be delivered under the Marshall Plan.

Three passenger car models are built at Mirafiori. In numerical order of importance they are the "500" with a four cylinder of 34.7 cu in., a 67 cu in. four-cylinder engine model, and a 91½ cu in. six-cylinder engine model. The three models are prewar design brought up-to-date and are not expected to be replaced by entirely new models until sometime this year at

the earliest.

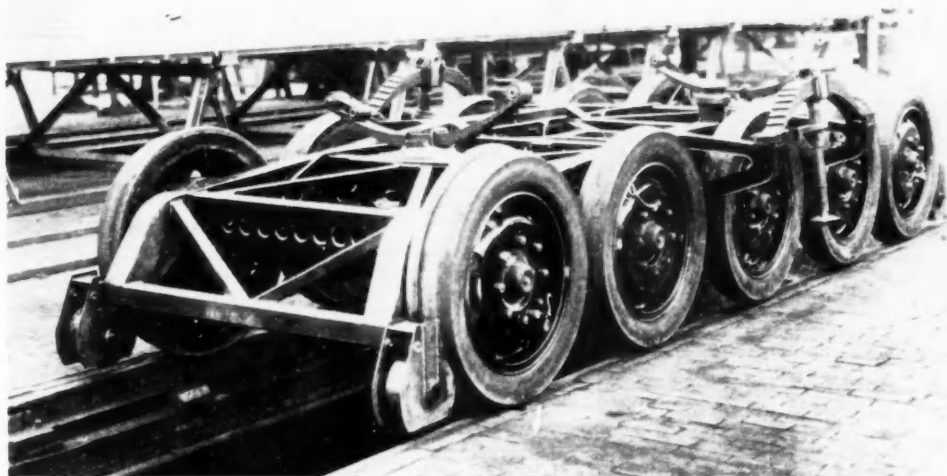
One of the best laid-out and the most modern factory in Europe, for it was planned as a unit in 1940, Mirafiori is responsible for all Fiat passenger car production and some of the trucks. The tool shop is particularly good and in addition to providing for the needs of the factory it is producing Cincinnati milling machines under license. These are used by Fiat and also sold on the outside market. A test track has been constructed by the side of the factory. Consisting of two parallel straightaways, united by two banked loops, it is 1½ miles round. Between the straightaways there are roughly paved and cross country sections and an overhead spray for testing body watertightness.

With its 15 main production plants, of which 12 are in Turin, Fiat is almost independent of outside supplies. Some of the truck production is carried out in the Lingotto works and in the recently-acquired Spa factory at Turin. The main lines consist of the 666N7 Diesel truck, with a six cylinder four-valve engine of 4.73 in. by 5.44 in. bore and stroke, and the 626NL Diesel with a six-cylinder engine of 3.94 in. by 4.80 in. The bigger of the two trucks is built with an eight-speed transmission and a double reduction rear axle. Both are two-axle jobs. There are also two main lines of bus chassis and a new three-axle trolley bus.

Practically all of Italy's aviation industry was bombed out during the war. Fiat's aviation work has been reduced to the repair and maintenance of American engines and a small production of private planes. In 1944 orders were given that all ball bearing plants of value to Germany should be wiped out. Among those thus scheduled for destruction was the Villa Perosa factory at the foot of the Alps, at that time a part of the Fiat group. This factory has been completely rebuilt and although no longer a part of the Fiat organization is meeting all that firm's requirements and covering the needs of other establishments.

*(Turn to page 86, please)*





## French Apply Automotive Design to Rail Car Bogey

**A**UTOMOTIVE technique has been applied throughout in the design of the pneumatic-tired trains which have just been put into service on French railways. On the 270 mile run between Paris and Strasbourg the six-coach trains, drawn by an oil-fired locomotive, are maintaining an average speed of 65 mph.

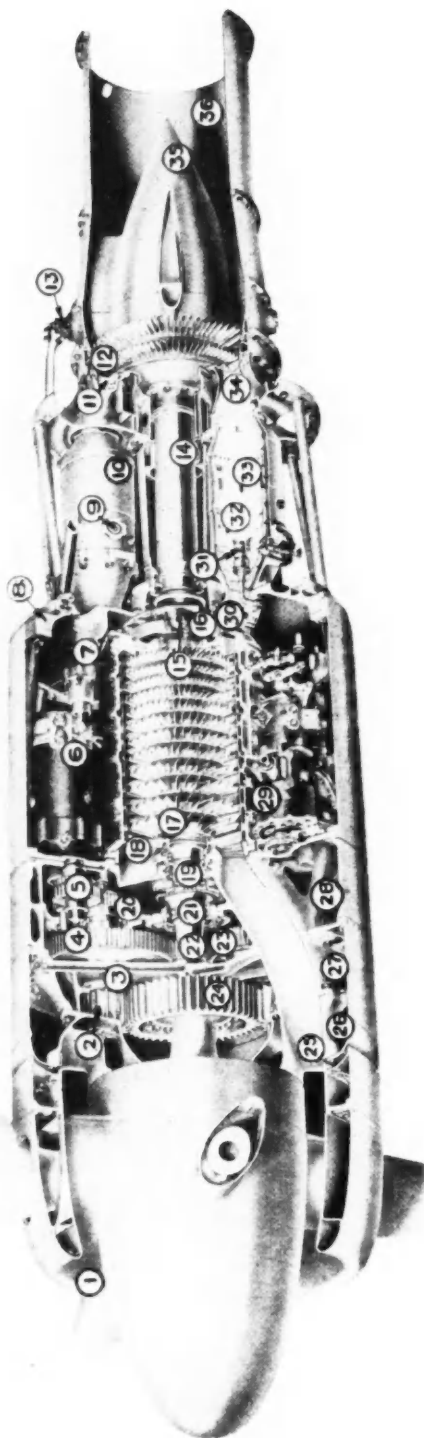
Michelin, who is responsible for the tire equipment, initiated the movement in 1931 when he introduced pneumatic-tired rail cars. The latest development consists of a train of six coaches, each 76 ft in length, with weight reduced to 14 tons, compared to 33.5 tons for the lightest normal type train. The two bogeys per car, designed by Michelin, are each mounted on 10 pneumatic tires. The five axles have bonded rubber attachment to the bogey. Truck-type steel carcass tires are used. The inner tube is a normal round section, for the design now makes it possible to run for a long period on a flat tire. Truck type detachable steel disk wheels are used, with separate automobile

type brake drums, having Lockheed hydraulic application. Inflation pressure is 128 psi and tire life is said to be in excess of 21,000 miles. The loading per tire has increased from 1430 lb in 1932 to the present figure of 2640 lb, largely due to steel carcass construction.

Three types of light bodies are being used: (1) a stainless steel construction under Budd license; (2) a welded all-steel body by Chausson of the same type as the firm's automobile coaches; (3) a body entirely in light alloys. Dimensions and equipment are identical for all three types.

Advantages claimed for the pneumatic tires with lightweight construction are silence and comfort; an adherence three times that of steel, and improved acceleration and deceleration. The train can accelerate from a standstill to 50 mph in a distance of 1000 yards and from 50 mph can be brought to a stop in 120 yards.

## Cutaway of British Naiad



D. Napier & Son, England, is in production of this gas turbine engine, the Naiad, designed for use with a full feathering propeller. It has a rating of 1500 hp and 241 lb of thrust at 18,250 rpm (sea level). Net weight (dry) is 1095 lb. The main components are a

12-stage axial compressor, five combustion chambers, and a two-stage turbine. Length from rear of nose spinner to exhaust cone outlet flange is 102 in. and diameter 28 in. The fuel control system incorporates a variable stroke reciprocating pump.

1. Hollow Spinner, air intake
2. Top layshaft, front reduction gear
3. Reduction gear top surge jet
4. Top layshaft rear reduction gear
5. Idle gear to starter
6. Electric starter
7. Auxiliary drive shaft

8. Engine mounting ring
9. Combustion chamber inter-compressor
10. Combustion chamber
11. Turbine stator blades
12. Turbine rotor blades
13. Oil feed, turbine rear bearing
14. Turbine shaft

15. Gimble mounting
16. Coupling, turbine/rotor
17. Compressor rotor blades
18. Compressor stator blades
19. Rotor shaft
20. Coupling rotor-main drive
21. Main drive shaft
22. Main driving pinion

23. Bottom layshaft rear reduction gear
24. Propeller shaft gear
25. Compressor inlet, left
26. Front gear casing
27. Intermediate gear casing
28. Rear gear casing
29. Propeller governor

30. Compressor outlet
31. Fuel burner
32. Starter valve
33. Combustion chamber
34. Combustion chamber outlet
35. Exhaust cone
36. Jet pipe

# AIRBRIEFS



By ROBERT McLARREN

## Budget Sounds Knell

Last month AUTOMOTIVE INDUSTRIES pointed out that the aircraft manufacturing industry could not accurately analyze its prospects for the year until the fiscal 1950 budget was presented to the Congress. The industry's worst fears were realized when the President asked only for enough money for the Air Force to support about 48 groups, instead of the 70 groups planned by the 80th Congress. The Truman program contemplates the construction of only 1669 USAF and 1000 Naval aircraft during the fiscal year, a reduction of nearly 1200 airplanes from the current program instead of the 50 per cent increase intended by the five-year 70 group program of the 80th Congress. While it is true that this is only the initial bargaining position of the President, he is backed by a Democratic Congress, the majority of which has publicly pledged its support. A powerful group in the House, led by Rep. Carl Vinson (D., Ga.), chairman of the House Armed Services Committee, has revealed intentions to repeat its performance of last year and volunteer substantial additional funds for aircraft procurement.

## Battle Seen Weak

But the coming battle of procurement money will hardly match the one of last year, when Secretary of Air Force Symington bypassed both Forrestal and Truman and went direct to Congress with his successful appeal for additional funds. This year Symington has been mysteriously chastened and has publicly expressed accord with the President's program. Thus, without the Air Force itself demanding additional aircraft, the House group is robbed of its principal impetus and observers predict little if any expansion of the President's 1950 budget request.

## Air Force Cuts Begin

First tangible evidence of Air Force discipline in the President's program reduction is a realignment of the fiscal 1949 procurement program so that the aircraft actually built during this year will fit into the fiscal 1950 program. Air Force cancelled contract plans for 30 Northrop RB-49 Flying Wing jet bombers (to have been built by Convair's Fort Worth, Tex., plant), 30 Northrop C-125 Raider assault transports, 51 North American B-45A jet

attack bombers, 118 North American F-93A swept-wing jet fighters and 10 Kellett H-10 helicopters of a total value of about \$300,000,000. Air Force took about \$200,000,000 of this money and awarded Convair a contract for 39 additional B-36 bombers. The remaining \$100,000,000 will be used for modification of B-36's and Boeing B-50's as flying tanker and aerial refueling aircraft.

## Shift Is Strategic

Behind this procurement realignment is an Air Force decision to strengthen its long-range strategic air power at the expense of its tactical (surface support) air power. This move does two things: it brings the Air Force group structure into an offensive striking force framework and enhances its internal Department of National Defense position as the agency having exclusive cognizance of long-range air power. Just how long that range is, the Air Force isn't prepared to say, mostly because it doesn't know. It does know that the Convair B-36 is the "last of the heavies" since calculations indicate that a longer range would require an airplane of ridiculously large size. USAF has actually shifted its attention from the range end of the bomber problem back to the performance end and will fit four Allison J-35 turbojet engines to the huge B-36 to increase its performance over short ranges at a considerable expense to its maximum range.

## Feeding the Multitude

As if our own Air Force was not on short rations enough, now comes the near-certainty of the United States joining the North Atlantic Joint Defense agreement with its obligation to provide substantial air power when required. While we may bemoan the sad state of affairs existing in our industry and our Armed Forces, the sobering fact remains that England, France, the Netherlands and the Benelux countries look to the United States Air Force and Naval Aviation as the prime constituent of their own aerial defenses. Britain's air power reached its post-war nadir the other day when Bomber Command was unable to carry out its mission in an air-sea exercise involving the approach of an "enemy" fleet towards England from the south. Although Coastal Command found the fleet and shadowed it for several days,

Avro Lincolns of Bomber Command, armed with huge photoflash bombs to simulate the atomic bomb, aborted their assignment. The French, Dutch, Belgian, etc., air forces are hardly worth mentioning. It is U. S. air power that must support the needs of these nations. Whether it is better to provide each of these countries with jet fighters and B-29 bombers on a lend-lease basis or to build up an omnipotent striking force in the continental U. S. for use in an emergency involving these nations is a problem the Pentagon, State Dept. and Congress will have to decide. But we don't think that 48 air groups is going to protect our own nation let alone those 3000 miles eastward.

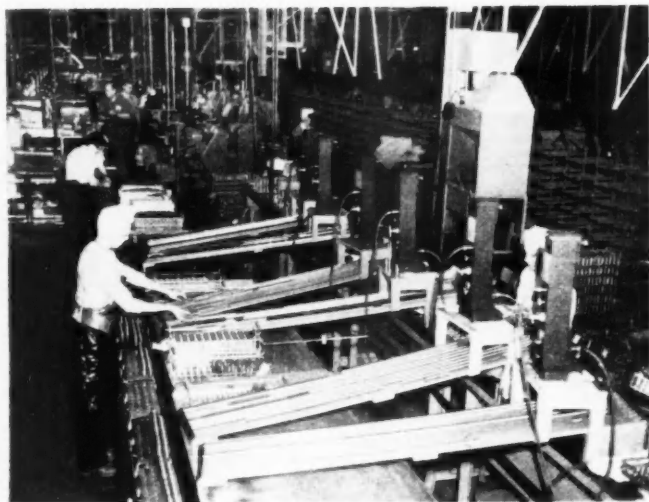
## Monkey Business

During the past six months the aircraft manufacturing industry has been treated to procurement manipulations that amount to little more than sheer petulance. The postwar crop of Air Force officers has seemingly assumed that aircraft production contracts are toys to be given and taken away as the mood strikes them. While this sort of play may go alright at an air station where the major does not complain of unfair treatment by the colonel, it assuredly is not the sort of business ethics to which the aircraft industry has grown accustomed.

On a dozen occasions the Air Force has issued letters of intent and publicly announced plans to procure millions of dollars worth of a certain airplane from a certain manufacturer. This manufacturer has forthwith planned, organized and, in at least one case, began tooling-up for production. Some of this work has involved obtaining bank credits, hiring new people, shifting key personnel (involving sales of homes in one city and purchase of new ones in a city 1500 miles away in one case), and all the manifold activities of preparing for production; then the contract was cancelled! Unquestionably the manufacturers are reimbursed for work-in-progress, etc., but these costs are infinitesimal compared to the intangibles. Such childish behavior by Pentagon officers with the adult businessmen of the matured aircraft manufacturing industry of this nation is inexcusable, regardless of the "change in tactical requirements" and other such mumbo-jumbo issued from Washington. We wonder just how "red hot" some of these young generals would look with no airplanes to fly in event of an emergency. But we fervently hope we'll never have to find out.

## DC-3 New Look

Just when it looked like the venerable Douglas DC-3 was at last going out of front-line service (American Airlines, first to get them in 1937, will retire their last DC-3 in March), Douglas has come forward with a package modernization program that could  
(Turn to page 98, please)



The foreground in this view marks the start of assembly of Buick valve lifters on the power driven high speed conveyor. At the extreme right is the row of Sheffield Precisionaire gages used for grading bodies and plungers in the manner described in the text. The chutes in the foreground transfer the graded parts within reach of the assembly operators who match bodies and plungers of the same grade and place them on the conveyor for the subsequent assembly operations.

## Making Hydraulic Valve with Ultra-Precision

THE changing picture of modern automobile engine design—as exemplified in the high compression, high economy, V-8 engines introduced by Cadillac and Oldsmobile—has placed new emphasis on the utilization of hydraulic valve lifters. In the General Motors divisions alone, hydraulic valve lifters are listed as standard equipment for 1949 models by Cadillac, Oldsmobile and Buick. The source of supply for these divisions is the Diesel Equipment Division, General Motors Corp., Grand Rapids, Mich. Established originally to produce Diesel fuel injectors for the GM Diesel engine divisions (see AUTOMOTIVE INDUSTRIES, March 1, 1947) DED has expanded its facilities and is straining its floor space with specialized equipment for making valve lifters. Although DED has served GM divisions exclusively from the start we find that valve lifters will be produced to meet the requirements of automobile and engine producers outside the GM family as well.

Machine operators, in the main, are women who have had no previous experience in industry and are trained primarily as machine tenders. Here the machine is relied upon to produce the close tolerances and fine surface finish. Clearances and fits are measured in terms of millionths of an inch.

Within the basic design of the valve lifter assembly there are natural variations in size and detail and even in materials to meet the needs of any type

or make of engine. Fig. 1, for example, is the assembly for the valve-in-head, straight eight engine, the oil supply being carried through the push rod. This unit has a diameter of 0.9985 in. plus 0.0000, minus 0.0010 in.; and an extended length, measured over a  $\frac{5}{8}$  in. diameter ball, of 2.617 in. plus or minus 0.029 in. The body of this lifter is a gray iron casting with a chilled foot.

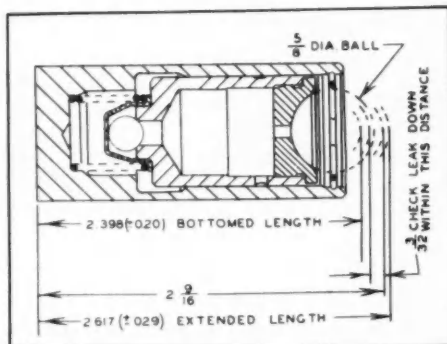


Fig. 1. Cross-section of the cast iron body type valve lifter for Buick engines.

The smaller valve lifter made for the new V-8 engines is basically like Fig. 2. It has a diameter of 0.8424 in. plus 0.0003 in., minus 0.0000; and an overall length of two in. In this type, oil is fed from a gallery and enters through a drilled hole in the belt.

The body for one type of V-8 lifter is machined from steel bar stock, later carburized, hardened and ground. The body for the other is an alloy casting hardened and ground.

The three types of lifters described here are given a final chemical coating to assist in break-in of the engine, but even this is subject to variation depending upon the customer's preference. For example, the cast iron body (Fig. 1) is Ferrox-treated; while the alloy casting (Fig. 2) is Lubrited. The steel body lifter is grit-blasted under controlled conditions after grinding and is then Lubrited. Similarly, the two units exemplified by the design in Fig. 2 have a large-

radius foot for contact with the cam while the one in Fig. 1 is flat.

Unique characteristic of the DED lifter is an apparent freedom from susceptibility to dirt in the crankcase lubricant. While the reason for this has not been established scientifically, it is thought to stem from the fact that the fluid is constantly recirculated within the lifter assembly. That is to say, the design is such as to use engine oil primarily to maintain pressure on the fluid once the assembly has been filled. Since leakage from the lifter is said to be negligible under operating conditions, the amount of make-up is quite small.

Because of the detail involved in the many steps of fabricating the components of a valve lifter, this article will touch only on some of the operations performed on the body and plunger. Generally speaking, the basic operations on the body and plunger, regardless of type and size, are handled in the battery of New Britain-Gridley automatics. The steel body—a comparatively new development—will be produced from bar stock in new bar type automatics now in the process of installation.

Consider now a few of the operations on the plunger and barrel for the cast iron unit (Fig. 1). As the plungers come off the automatics they are gas-car-

# Lifters Equipment

*Diesel Equipment Division of GM Relies  
Upon Accuracy of Machines Rather  
Than Operator Skill to Produce Close  
Tolerances and Fine Surface Finishes*

By Joseph Geschelin

*Following precision boring in the Ex-Cell-O machines, bodies go to the Micromatic Microhane machines, one of which is shown here. These are of Microsize type, with two spindles and a four-station indexing table. The Sheffield Precisionaire gage used extensively for inspection may be seen mounted on the table of the machine.*





burized in a new Holcroft furnace installed right in the screw machine line. Following heat treatment, the OD of plungers is finish-ground in a battery of Landis centerless grinders. This is a group of five grinders arranged for automatic through-feed grinding, the transfer from one machine to another being made by means of the conveyor connecting them. The operation is fast and completely automatic, and produces a surface finish in the range of three to six micro-inch (rms) with a general average finish of four micro-inches.

Facing and boring of the ball-check end of the plunger is done automatically in an ingenious set-up in Heald Bore-Matics, as illustrated. The machine is of single-end, three-spindle type with each station fed by automatic magazine feed. The only function of the operator is to keep the three magazines filled. Each head has two special tools operated automatically to provide the given cycle of events. One tool comes in to finish-turn the step in the OD; the second tool does the boring and finishing of the end face.

In the operating cycle the Heald is timed automatically to feed three plungers from the magazines into working position. Upon completion of boring cuts the plungers are automatically ejected onto a moving conveyor belt at the level of the table which carries the parts to the operator.

The fussy operation on the cast iron body is that of producing a precision bore—true to nominal size within 0.0005 in., round and free from taper and with fine surface finish. The first step to this end is precision boring in an Ex-Cell-O single-end, four-spindle precision boring machine with magazine feed for each spindle. After the cut has been completed, the tool heads retract, the work holding block is moved upward, and at that point four plungers move in from

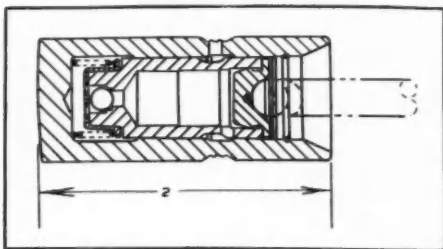
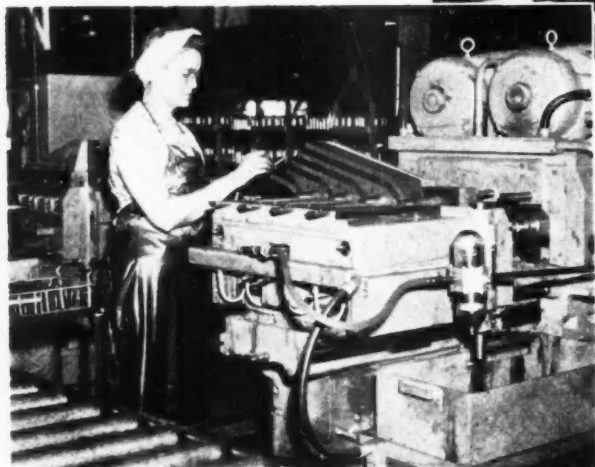


Fig. 2. Cross-section of the steel type body valve lifter for the V-8 engines.

the opposite end to eject the plungers into the tubes which may be seen in the illustration. Since only a single boring operation is required the cycle of events is extremely rapid.

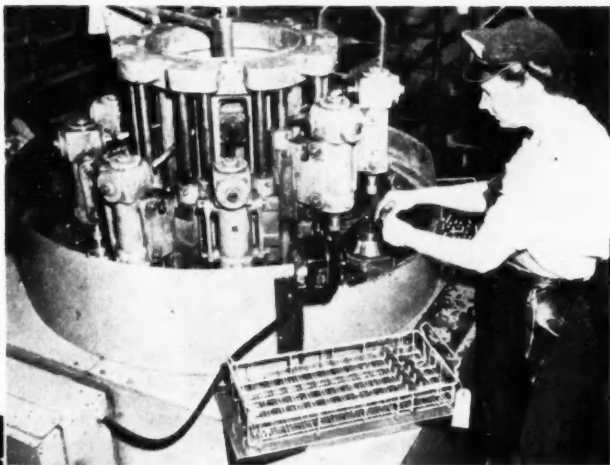
Following precision boring the cast iron body goes to a Micromatic Microhone machine, fitted with Micro-size attachments, for precision honing of the bore. As illustrated, this is a two-spindle machine with a four-



Final proof checking of the vital characteristics of leakdown and ball recovery is done in multiple-station, rotary inspection machines such as the one shown.

This is one of the Ex-Cell-O precision boring machines set up for boring bodies. These machines are of four-spindle type, each spindle being fed by one of the four magazines seen at the top center. After boring, the bodies are ejected automatically into the chutes which may be seen just below the magazine.

One of the nine-head Gisholt honing machines mentioned in the text is pictured here. It is used to produce the radius on the foot or closed end of the steel or alloy bodies.



Here is one of the three-spindle Heald precision boring machines set up for turning, facing, and boring the closed end of the plunger. Spindles are fed automatically from the three magazines in the center. Work is automatically ejected and is dropped onto the moving belt conveyor which may be seen terminating at the extreme right.



## Making Hydraulic Valve Lifters

completely mechanized on a closed circuit table-high conveyor shown here. An important aspect of assembly is the process of selective matching of the plunger and body to produce the desired diametral clearance. For the cast iron unit diametral clearance is held within 0.0005-0.0007 in.; for the steel units it is held to 0.00016-0.00027 in.

Returning to the matter of selective matching of body and plunger, consider that the body bore and plunger OD are held to a total tolerance of 0.0005 in. The assembly line is provided with a group of precision air gages for checking body bores and plunger OD. On each of these gages the total tolerance of 0.0005 in. is expressed by means of a wide band which is divided into ten segments or segregations, as they are termed by DED. Bodies and plungers, consequently, are graded in ten segregations, thus grouping parts in variation of only 50-millionths of an inch apart.

As the parts are graded they are dropped into chutes which lead to the assembly conveyor and at this point the operators select the matching parts. Actually what they do is to match an "A" grade body with an "A" grade plunger, a "B" body with a "B" plunger, etc. These matched pairs then constitute the first basic step in the assembly process.

Near the end of the assembly line the finished-assembled units are tested in the inspection fixture, as illustrated, to assure conformity with specifications for leak-down and ball recovery. The operation is performed automatically, the rate of leak-down being measured by a timing mechanism graduated in seconds.

(Turn to page 82, please)

station indexing table. (Shown on page 43)

Consider now some of the special operations on an alloy body. Before the rough casting is fed to the automatics, the open end of the casting is rough ground to a relatively smooth finish in a horizontal Hanchett grinder fitted with a drum type indexing fixture for holding the work. Next the OD of bodies is green ground in a battery of four through-feed Cincinnati Centerless grinders. This is a completely automatic operation from start to finish, the parts being fed to the first grinder from a large overhead hopper, then transferred by the connecting conveyor from one machine to the other. At the end of this line the bodies are ready for the automatics.

One of the interesting operations on both alloy and steel bodies is the finish grinding of the spherical radius on the foot end. One type has a radius of 60 in.; the other a 30-in. radius. This operation is done in special Gisholt spherical honing machines of nine-head type, as illustrated.

The assembly of large-production cast iron units is

# First Production Example Of High Speed, Skip Welding

SEEKING an improved and lower cost method of producing interrupted welds for joining the ring gear to the flywheel on Dynaflo transmissions, the Buick Motor Division of GM has developed the first production example of high speed, skip welding in conjunction with the familiar Lincolnweld submerged arc welding technique. This project is credited to the work of the experimental welding department at Buick and marks the development of a unique electronic control device for timing all functions of the welding machine with hairline accuracy and in terms of fractions of a second.

The Dynaflo flywheel is a heavy gage steel stamping which serves as a coupling between the converter and crankshaft. Conventional methods of attaching the ring gear proved impractical and the only success-

ful initial production method was by hand arc welding. It was found necessary at the start to make a number of intermittent welds about two in. long rather than a complete seam weld since the latter procedure tended to distort the workpieces. It was realized at once that hand welding of this character was slow and expensive. Hence the urgent need for a practical automatic procedure.

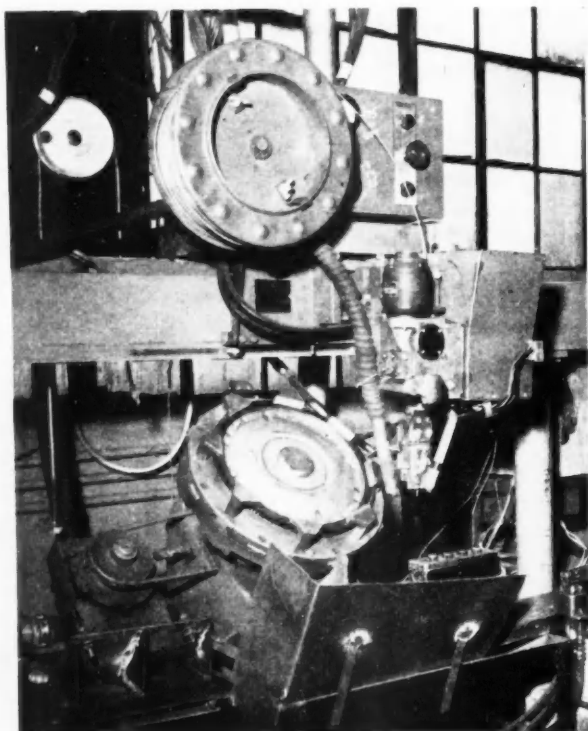
As illustrated, the first machine now used in regular production has an automatically indexing, inclined fixture provided with positive air clamping of the work and actuated by an infinitely variable drive. The welding head is a standard automatic Lincolnweld submerged arc unit, fed from a Lincoln generator. The heart of the device, however, is the electronic control cabinet which was visualized and built by Buick engineers.

In current production, the welder is arranged to make eight equally spaced weld joints, each about two in. long. Since the joint on the flywheel pictured here has a developed length of about 45 in., the welded length represents a little over one-third of the joint length.

Welding is done at a speed of something over 100 inches per minute. At this rate the duration of a single weld is slightly greater than one second.

Timing of the welding cycle in this set-up is accomplished by means of lugs or cams spaced around the periphery of the indexing fixture. The cycle is initiated as the cam contacts a micro-switch mounted over the top of the fixture. One of the timing relays then controls the duration of the weld and quenching of the arc, while other timers control the other functions such as feeding of the wire, etc.

(Turn to page 70, please)



Here is a view of the basic elements of the automatic skip-welding machine as set up for initial production. The inclined work fixture may be seen in the center. The Lincoln automatic welding head is mounted above. The variable speed drive for the fixture may be seen at the left with the belt connected within the housing under the fixture.



Model 910N tractor with sleeper cab.

# New Diamond-T Diesels

**F**OLLOWING several months of production experience the Diamond T Motor Car Co. is making the first public announcement of its Model 910N Series extra-heavy duty, Diesel-powered trucks, available in four-wheeler and six-wheeler types with maximum gross weights ranging from 36,000 to 50,000 lb. As a tractor the new model has a rating at maximum road speeds up to gross train weights of 76,000 lb.

The power plant is the six-cylinder NHB-600 Cummins Diesel engine with an output of 200 hp at 2100 rpm governed speed. Maximum torque is 537 lb-ft. Equipment includes a 12-volt electrical system, tachometer, two oil filters, oil cooler of heat exchanger type, and a fuel filter. The intake system is a special Diamond T feature with a 3-qt oil bath air cleaner located outside the hood to provide cooler air. An air intake silencer is built in.

The Timken FE Series front axle is standard on all models. At the rear, the Timken U200-P full floating double-

reduction rear axle is standard on the four-wheeler; while the Timken U300-P, of double-reduction two-speed type, is offered as optional equipment. The lighter rated six-wheeler has the Timken SW3012PA dual drive tandem axle with eight parallel torque rods. It is of worm drive type and is limited to high speed highway service applications. The extra-heavy six-wheeler model is fitted with the Timken SW456P and SD462P dual drive tandem axles which are basically similar to the SW3012PA, but designed for greater

(Turn to page 82, please)

## Diamond T Model 910N

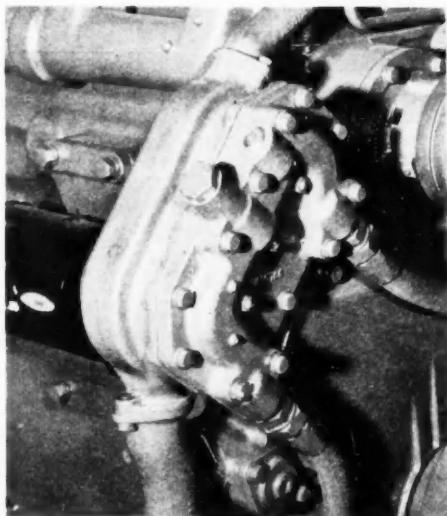
### Condensed Specifications

	Model 910N	910NSW3012PA	910NSW456P 910NSD462P
Nominal Rating.....	7½-10 tons		
Maximum Gross Weight.....	36,000 lb	40,000 lb	*50,000 lb
Maximum Gross Train Weight.....	60,000 lb	76,000 lb	76,000 lb
Nominal Chassis Weight.....	12,300 lb	15,000 lb	16,300 lb
Effective Wheelbase.....	**154¾ in.	188¾ in.	188¾ in.
	187¾ in.	208¾ in.	208¾ in.
	172¾ in.	224¾ in.	224¾ in.
		238¾ in.	238¾ in.
Engine.....	Cummins NHB-600		
Clutch.....	Spicer 14 in. 2-plate		
Rear Axle.....	Timken U-200P	SW-3012PA	SW-456P
Brake Size and Lining Area.....	18½ x 7	18½ x 6	18½ x 7
	658 sq in.	690 sq in.	1016 sq in.
Axle Ratios.....	6.42, 7.06 and 7.84 to 1	6.16 to 1	6.0, 6.8, 7.6 or 8.2 to 1
Optional Rear Axle.....	U-300P		SD-462P
Ratios Optional Axle.....	4.82-6.42		8.07, 10.18, 11.88 to 1
Largest Tire Available.....	6.41-8.37 11.00-24	**11.00-22	***11.00-24

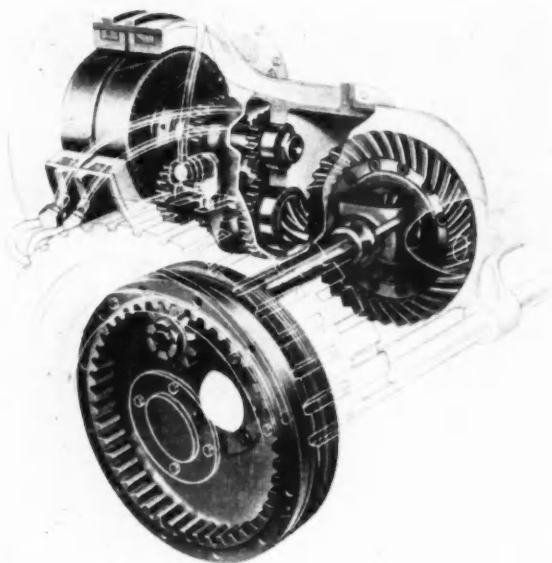
\*Maximum Gross Weight is reduced to 45,000 lbs. for these models when used for excavating, logging, etc.

\*\*154¾ in. wheelbase available only with U-300P rear axle and no auxiliary transmission.

\*\*\*When 11.00 tires are used on six-wheelers overall width at rear is 26.25 in.—exceeds legal limit for normal highway service.



This aircooler of heat exchanger type is standard equipment on Model 910N engine. Oil temperatures are reported 37 deg lower at full load.



*This view shows how power is transmitted from the engine through the Dynatork Drive to the rear axle of the Clark truck.*

A NEW electro-magnetic transmission known as the Dynatork Drive which eliminates the need for a friction clutch has been developed by the Industrial Truck Division of Clark Equipment Co. for use on its 6000-lb

## Magnetic Induction Drive

capacity, gasoline engine powered fork-lift truck. Two electro magnets, mounted in the flywheel, are the driving members. Driven members are two rotors attached to the special constant mesh, forward and reverse transmission gears. There is no metal-to-metal contact between these rotors and the driving members.

A selector switch on the steering column provides "forward", "reverse", and "neutral". When either the forward or reverse flywheel coil is energized, a strong magnetic field is set up between the coil and rotor, thus transmitting rotating force through the constant-mesh gearing to the axle and wheels.

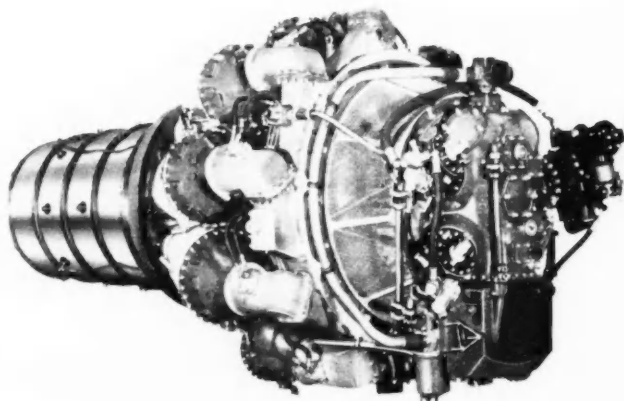
Two gear ratios, high and low, are provided and selection is by means of a lever in the floor board position. The low ratio is used only for extreme grades or other unusual operating conditions. For slow and careful maneuvering, current to the flywheel coils may be varied by means of a foot pedal located to the left of the steering column.

## Turbo-Wasp Data

PRATT & WHITNEY's turbojet engine (JT-6B Turbo-Wasp), a photo of which is shown here, has a double-sided centrifugal compressor, nine combustion chambers and a single stage turbine. Compression ratio is 4.3 to 1 and the air mass flow 88 lb per sec at 12,300 rpm at sea level, at which speed the temperature is 1365 F after the turbine. Maximum fuel injection pressure is 1050 psi.

At sea level (static), its take-off rating is 5000 lb at 12,300 rpm, its normal rating 4000 lb at 11,600 rpm and its cruise rating 2700 lb at 10,500 rpm. Fuel consumption is 1.09 lb per thrust-lb per hour. Fuel can be either 100/130 octane gasoline or kerosene.

Diameter of the engine is 49.5 in., its length 103.25 in., and its frontal area 13.4 sq ft. Weight is 1715 lb.





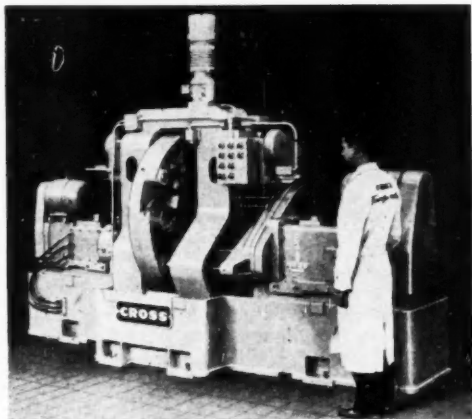
## B-27—Intake Manifold Finishing Machine

A new special machine tool which completely finishes automobile dual carburetor intake manifolds, except for milling, has been designed by the Cross Co., Detroit, Mich. Operations include drilling, reaming, and tapping. Production of 155 pieces per hour at 100 per cent is said to be substantially greater than formerly.

The new equipment has a five station power index trunnion with an independent station for loading and unloading while the machine is operating. Four pieces are cut at a time progressively. Through the use of standard Cross



For additional information regarding any of these items, please use coupon on page 60.



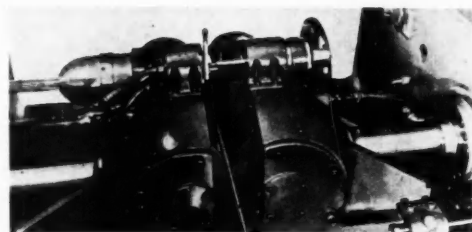
Cross special machine for finishing dual carburetor intake manifolds.

units, flexibility for reasonable product design changes is achieved.

Other features include fluid drive index with overload protection for safety, hydraulic feed for drilling and reaming, lead screw feed for tapping, and hardened and ground steel ways.

## B-28—Heavy-Duty Thread Miller

Watson-Flagg Machine Co., Inc., Paterson, N. J., made addition to its line of precision thread rollers in the form of a heavy-duty model C having ability to roll continuous threads, knurls, or serrations in class 4 screws. The model employs rolling, in contrast to machining methods, for this operation.



A frame of great weight and sturdiness provides 72 per cent higher hydraulic pressure.

Sundstrand machine for contour milling of small parts.

Watson-Flagg heavy-duty precision thread roller.

lically-applied rolling pressures in order to accommodate higher physical properties of material, greater diameter and pitch thread sizes, and increased length of work.

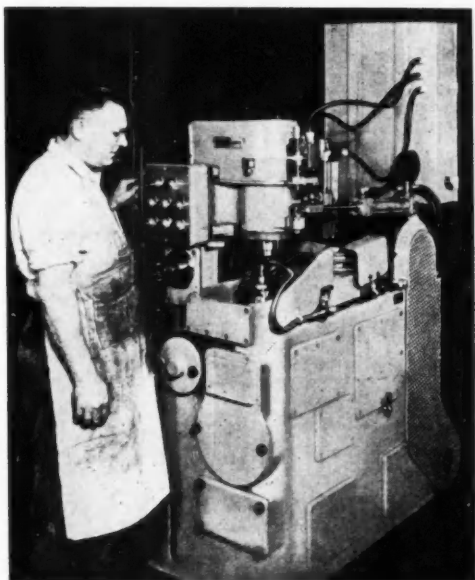
The machine now takes diameters from .138 in. up to 4 in. with a maximum of 8 pitch. Its regular length of thread capacity, when through-rolling is not being used, is 2 1/4 in. standard, 3 1/4 in. maximum, handling any material that has appreciable percentage of elongation.

Threads, knurls or serrations are formed as the blank is rotated between two cylindrical dies of 6 1/2 in. average dia. These large dies provide high surface rolling speeds (200 to 540 ft per minute) and an average of 20.4 in. of useful circumference.

Simplicity of set-up, said to be an inherent advantage of the two-die principle, is such that a complete job change-over can be made in an average of 30 to 45 minutes, according to company claims. The work-rest and dies are the only parts required for this change. Cycle control, positive stop, and micrometer size control are rapidly adjustable.

## B-29—Contour Milling Machine

A cam-controlled contour milling machine, designed for milling irregular contours on work parts from master cams, has been designed and built by Sundstrand Machine Tool Co., Rockford, Ill. It combines in one machine a vertical spindle milling head, a cam follower, a cam-carrying table and a rotary work table, and features automatic cycles for both internal and external milling of practically any con-



tour on work parts up to 5 in. dia. Compact design permits line installation of a group of these machines for operation by one operator, who need only unload, reload and start the automatic machine cycle. A feature of the machine is its ability to cut master cams from sample parts, eliminating engineering of intricate cam profiles.

The machine has a  $\frac{3}{4}$  hp milling head and a cam follower spindle mounted together on a swinging arm. The ratio between the cam roller arm and the cutter arm is 2 to 1 which reduces any cam error  $\frac{1}{2}$  on the finished part. The master cam, in most cases, can be made considerably larger than the work piece so as to eliminate excessive cam rises.

The cutter spindle is driven by "vee" belt from a  $\frac{3}{4}$  hp variable speed unit, producing infinitely adjustable speeds ranging from 425 to 4150 rpm. The cutter spindle is mounted in a head having  $3\frac{1}{4}$  to 8 in. vertical adjustment from top of rotary table to spindle nose. Spindle quill is provided with hydraulic vertical feed with a total quill movement of  $1\frac{1}{4}$  in. controlled by dogs for rapid advance, feed and rapid return cycle. Adjustments for various diameters of work, cutter wear and depth of cut are obtained through micrometer adjustment of arm.

The 6 in. dia rotary table and the cam-carrying spindle are both worm driven off the same motor at 1 to 1 ratio. Table feeds are variable from 0.2 to 5 rpm, and the rapid rate is 40 rpm. Quickly set dogs on a cycle disc control the degree of table rotation in rapid approach, feed and return in either direction up to  $1\frac{1}{3}$  revolutions. The machine has over 24 possible cycle combinations.

### B-30—Machine-Tool Speed-Control Drive

A Thy-mo-trol drive, Type H1, is available from General Electric's Control Division, Schenectady, N. Y., to provide, by the turn of a knob at a single control station, smooth stepless speed



G.E. Thy-mo-trol drive (cover removed) applied to small bench lathe

## NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 60.

control on small lathes, grinders, drill presses, conveyors, and pumps. Furnished in ratings through  $\frac{1}{2}$  hp, and utilizing a simplified half-wave circuit to provide d-c flexibility from a-c power, the drive operates from 220-volt, 60-cycle a-c source. (For other voltages a suitable anode transformer is available.) It has a 20-to-1 speed range from 1725 to 86 rpm, operates in ambient temperatures from 50 to 104 F, and is furnished in non-reversing or reversing type.

Designed for constant-torque loads, under normal conditions the new drive has speed regulation from no load to full load. Dynamic braking permits quick stopping.

### B-31—Press for High Speed Stampings

**Warco**

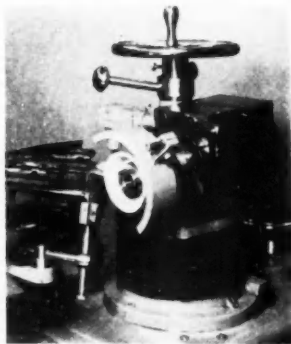
75-ton press designed and built by the Warco Press Division of the Federal Machine and Welder Co., Warren, Ohio, for producing stampings continuously at high speeds.

The press is of welded and stress-relieved steel construction with hand-fit square gibbing to assure alignment, equipped with full eccentric shaft having extra long, rigid supporting bearings. Adjusting screw is barrel type with short one-piece Pitman, for rigid connection. Air counterbalancing reduces shock of "break-through." Lubrication is automatic for all wearing surfaces. Variable-speed drive, accessible location of all adjustments, and installation of die cushions, if required, are provided for.

Auxiliary equipment includes a Warco precision double roll feed having infinite variation in feed lengths from zero to maximum. Synchronized scrap shear is available. Stock oiler is a built-in feature.

### B-32—Versatile Tilting Wheel Head

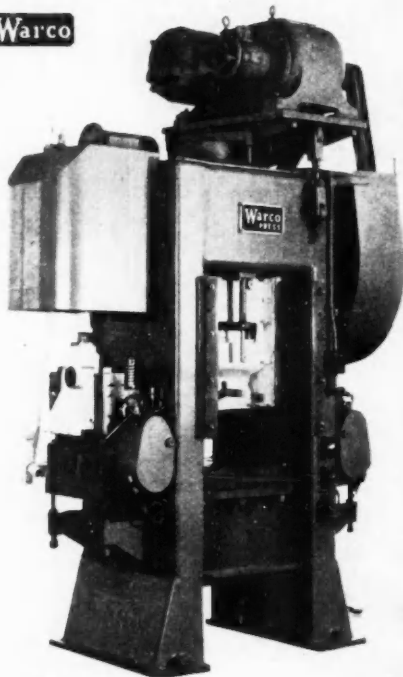
A new tilting wheel head which can be inclined  $\pm 15$  deg from the horizontal



Norton tilting wheel head set at 5 deg. angle mounted on new Norton No. 20 cutter.

and swiveled 360 deg under a horizontal plane is being featured on a new No. 20 cutter and tool grinder offered by Norton Co., Worcester, Mass., for the simplification of set-ups.

While grinding a spiral taper reamer, for example, angle may be set at 8



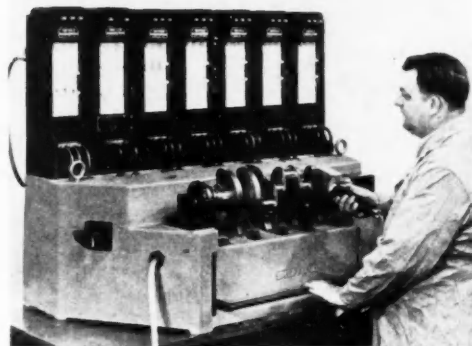
deg to afford a clearance angle that is constant for its full length, avoiding trial and error tactics. While grinding a form tool, the tilting wheel head may be set to a 2 deg angle for single set-up grinding and minimized wheel truing.

Illustration below shows the tilting head at a 5 deg angle while grinding the end of a large 5 in. by 10 in. milling cutter between centers, swivel table set at 90 deg. Relocation of the cutter is unnecessary for the OD grind; swivel table need merely be reset to 0 deg.

# NEW Production and Plant EQUIPMENT

For additional information regarding any of these items, please use coupon on page 60.

## B-33—Crankshaft Gaging Machine



Sheffield gaging machine for checking crankshafts.

A gaging machine using twenty Precisionaire tubes has been developed by the Sheffield Corp., Dayton, Ohio, for accurate checking of an automobile crankshaft for size and out-of-round.

The five main bearings are checked simultaneously with five Airsnaps, each having three sets of jets so as to gage midway between flanges and at  $\frac{1}{8}$  in. from each flange. These Airsnaps are floated so that they may move forward and backward to allow for misalignment due to possible warpage in the crankshaft. At the same time two other Precisionaire jets check the seal diameter at one place and the width of the rear main bearing.

The diameter at each end of the pin bearing and the breakdown of the radius at the cheeks are checked manually with an individual Airsnap having three sets of jets.

## B-34—Multiple Station Piston Gage

To facilitate assembly of automotive pistons, Pratt & Whitney, Division of Niles-Bement-Pond Co., West Hartford, Conn., presents a specially designed multiple station piston gage which checks six dimensions simultaneously, stamps two grades, and automatically shows the number of pistons of each grade inspected. The gage uses Pratt

& Whitney Electrolimit and Multiple Electric Contact gaging mediums.

When the inspector pushes the piston into gaging position, the gage is in operation. By looking at the instrument panel, the inspector has the complete information on each piston. At the same time the piston is automatically marked on top with the grades of the skirt dia and the pinhole dia.

A meter at the left indicates grade of pinhole dia and operates the second row of lights at the top of the gage. The meter at the right indicates grade of



Pratt & Whitney multiple station piston gage

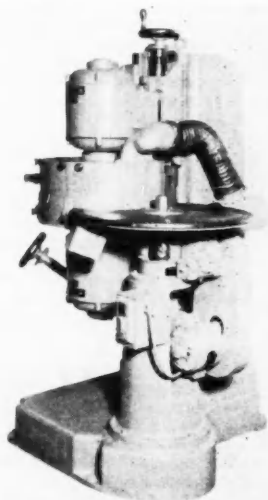
skirt dia and operates the top row of lights. Width of the ring grooves are checked by the red and green lights in the center. A green light means undersize and the red light, oversize. When neither light is on, the ring groove width is within size.

Counters at the bottom show total of each grade of skirt dia gaged.

## B-35—Double Vertical Spindle Grinder

Charles H. Besly and Co., Chicago, Ill., is now in production on a new double vertical spindle grinder designed for fast precision grinding of small parts. The machine grinds wet or dry as fast as it can be loaded. With manual loading by a skilled operator, the new grinder's output is cited at 2,400 pieces per hour. With a hopper feed attachment the machine can produce 5,000 or more pieces per hour, depending upon area of the pieces to be ground.

Listed as No. 905, the grinder provides quick convertibility from one job to another by replacement of the feed wheel.



Besly double vertical spindle grinder, No. 905.

Fast gravity loading and unloading is obtained by the horizontal position of this feed wheel.

In addition to handling such varied types of production grinding as coil spring ends, carbon brushes, ceramics and plastics, the new 905 is adaptable to other types of production grinding on small steel, aluminum, copper, brass and gray iron parts.

Specifications: two 3 hp motors, 1750 rpm on grinding heads, overall length and width 41 $\frac{1}{2}$  in. and height 66 in. Choice of 15 in., 16 in., or 18 in. dia abrasive discs is offered.

(Turn to page 64, please)

## C-28—Plastic Coated Trunk Lining

Burlington Mills, Inc., Burlington, Wis., has developed and is marketing a plastic coated and plastic printed trunk lining material. The base is a sound-insulating jute felt, coated with plastic,



*Burlington plastic coated, plastic printed, trunk lining material.*

printed with permanent waterproof inks, and embossed. Wearing qualities of the surface make it washable, resistant to gasoline, motor oil, alcohol and other common solvents. The material is available in any combination of colors and patterns to suit styling.

## C-29—Magnesium Axle Assemblies

An 18,000 lb capacity trailer axle with magnesium brake assembly and magnesium hub has resulted from cooperation between the Shuler Axle Co., Louisville, Ky., and the Development Dept. of the Dow Chemical Co., Midland, Mich. Axle assembly is so much lighter than a conventional steel assembly, or even than aluminum, that it is said to pay the operator a 100 per cent profit on his extra investment in the first year, and 200 per cent each year thereafter, according to Shuler.

Economies of the magnesium "axles" are figured on a weight-saving of 150 lb per axle with magnesium which, according to the dollar-a-year-a-pound formula, yields the operator \$150 per



*Shuler Axle Co. wheel hub, brake spider, and brake shoe of 100 per cent magnesium, top row, weighing less than half as much as conventional malleable iron ones, illustrated in bottom row.*



*For additional information regarding any of these items, please use coupon on page 60.*

yr. Thus, although the magnesium assembly cost \$75 more than steel, it figures to save \$75 the first year and \$150 each succeeding year, the company avers.

## C-30—Phenolic Plastic Soft Jaw Blanks

Available to every user of Gisholt chucks, a lightweight plastic soft jaw blank developed by the Gisholt Machine Co., Madison, Wis., is said to have 2 to 2½ times the gripping power of soft steel jaws under the same chucking pressure when holding soft, malleable, distortable work in lathes.

The manufacturer recommends these plastic blanks when holding on a machined surface, when holding tubing or other thin wall parts—for use with either 1st or 2nd operation work. They are recommended for holding cast iron, aluminum, brass or any other material that does not require coolant during machining.

Of a molded phenolic type plastic, the jaws can be machined to size with the same feeds and speeds used for brass.

## C-31—Gasket for High Compression Motors

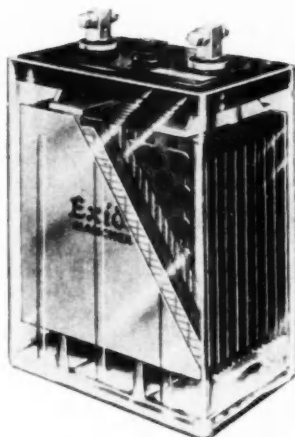
A new type gasket of electrically annealed steel with aluminum-fused-oxide finish is being made by the Fitzgerald Manufacturing Co., Torrington, Conn. Developed to withstand pressures in the

new, higher compression motors, these new Fitzgerald metallic aluminum-fused-oxide steel asbestos gaskets are said to be equally suitable for low compression motors. The steel is tempered to provide compressibility and resiliency to insure a perfect seal and it is then electrically coated with aluminum-fused-oxide to be rust-proof and easy to remove whenever the head is taken off.

## C-32—Sealed Glass Jar-Type Battery

Known as the Exide-Manchex, a new battery announced by the Electric Storage Battery Co., Phila., Pa., is of the sealed glass jar type and applicable to all type stationary power in electric utilities, railway signaling, telephone, emergency power and lighting.

A feature is the positive plate known as the Manchester type. This plate consists of a grid cast of a lead antimony alloy in which the active material is in



*Exide-Manchex sealed glass jar-type battery of the Electric Storage Battery Co.*

the form of pure lead buttons. These buttons are forced by hydraulic pressure into circular openings in the grid. This form of active material does not wash away and is claimed an important reason for the long life of the Manchester plate.

The "Permanized" negative plate is constructed of a lead antimony grid or framework with a series of vertical ribs connected by short horizontal bars. These bars, which are flush with the plate surface, extend only part way through the plate and are staggered on opposite sides. The active material is in the form of strips or ribbons of sponge lead, extending from top to bottom of the plate between the ribs and locked in position by the horizontal bars.

The separators are of specially treated wood, teamed with low resistance slotted plastic separators—a combination said to provide proper insulation between plates and to assure high discharge

characteristics under all operating conditions.

Excellent high rate discharge characteristics are obtained from these cells because of the heavy terminal posts equipped with copper inserts (except in the three smaller size cells) and the heavy straps between the plates and terminal posts. These same cells are also equipped with a burned ring seal where the post is fitted through the cover. This permanently seals the opening around the posts and eliminates electrolyte seepage.

The Exide-Manchex is available in capacities from 440 to 960 am. hours.

### C-33—High-Low Stack Attachment

Introduced on Clark Carloader fork-lift trucks, the Hi-Lo-Stack, a high-lift low-clearance device, is now offered in a special design for the Clark Clipper models by the Industrial Truck Division, Clark Equipment Co., Battle Creek, Mich. The device fits both gas-powered and electric battery-powered machines of 2000 lb cap.

The Hi-Lo-Stack mounted on the Clipper permits an overall collapsed height of 83 in., a maximum lift of 130 in., and a "free lift" of 64 in. without increasing overall height of the machine. These heights permit passing through 7-ft-high openings, and also to tier unit loads to ceilings in boxcars with low clearance, or to 130 in. in storage and warehouse areas.

The Hi-Lo-Stack includes a single hydraulic lift-cylinder and single set of uprights, and Clark's balanced hydraulic system for lift operation.



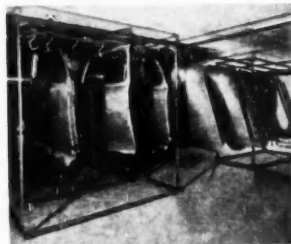
Clark gas-powered Clipper model equipped with Clark Hi-Lo-Stack attachment.



For additional information regarding any of these items, please use coupon on page 60.

### C-34—Adjustable Storage Racks

Free-standing, adjustable automotive storage racks comprising channel bars assembled with eight basic fittings are



Unistrut adjustable re-usable automotive storage racks.

offered by Unistrut Products Co., Chicago, Ill. Called Unistrut, this continuous-slot framing can be assembled with a wrench and a hacksaw. Drilling is unnecessary since spring-backed nuts slide along the continuous-slot or channel to any desired point at which another member is to be joined. Welding is unnecessary since the Unistrut connectors applied at these points provide the strength of welding, the company states, and additionally can be taken apart for re-use in other combinations.

At the connecting point the nut forms the fourth side of the channel of the framing, special grooves in the nut face locking with the channel edges to assure a solid set when tightening or loosening.

To make a frame connection this spring-backed clamping nut is inserted in the continuous slot of the strut, slid to position, a cap screw which fits into the nut is tightened against the fitting piece, and the connection is complete.

This construction system affords simplified building of numerous types of supports, mounts, pallet racks, stock racks, barrel racks, bar and tube storage racks, display and stockroom shelving, and pipe and cable hangers. Standard size of automotive storage racks is 6 ft 8 in. by 2 ft 11 in. by 6 ft 8 in.

### C-35—Non-Marring Non-Recoil Hammer

The "Tahlen" non-marring non-recoil hammer manufactured by Dake Industries, Ltd., Vancouver, B. C., is a 1-lb



Dake Tenite-tipped non-marring non-recoil "Tahlen" hammer.

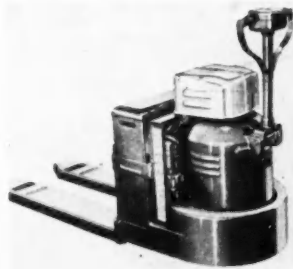
tool, with clear amber Tenite tips measuring 1 1/2 in. in dia, for use in machine, mold-manufacturing, and die shops. The tough, resilient injection molded plastic tips withstand heavy impact without cracking or flaking. They are force-fitted directly onto the grooved nipples of the hammer head in an assembly claimed virtually loose-proof.

Between the smooth Tenite tips is a hollow metal head containing a charge of steel grit. As the tip is lowered, the charge follows, practically eliminating recoil of the hammer after it has struck. This reduces shock to the wrist and arm and, according to the manufacturer, results in approximately 30 per cent harder blows. The relatively soft plastic tips cannot mar harder materials during hammering, it is said.

Tips are molded by Plastal Specialties Co., Seattle, Wash., of cellulose acetate butyrate Tenite, product of Tennessee Eastman Corp., Kingsport, Tenn.

### C-36—Battery Powered Pallet Truck

Towmotor Corp., Cleveland, Ohio, has entered the electric hand truck field with a battery powered, compact pallet type unit for closer quarters, providing rapid lifting of loads, high traction, and safety handle with control buttons for either



Towmotor battery powered hand pallet truck, model W.

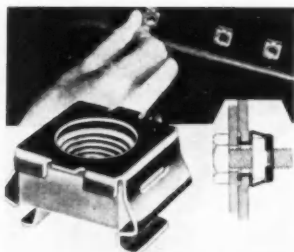


right- or left-hand operation. A 3-point suspension assures smooth travel over uneven surfaces, and differential-action trailer wheels eliminate wheel scuffing and provide easy turning.

A safety feature of the model W electric hand truck is an automatic power cut off which, upon release of the control handle, instantly cuts off power supply to the motor and applies a positive quick-acting brake to the drive shaft, immediately stopping the truck.

### C-37—Snap-Action Nut Retainers

A Speed Grip nut retainer for fastening square nuts to sheet metal panels, brought out by Tinnerman Products,



Tinnerman Speed Grip nut retainer.

Inc., Cleveland, Ohio, eliminates welding, clinching or staking. These nut retainers snap into place by hand or with a screw driver, their spring steel "mechanical hands" holding the nut in bolt-receiving position.

In its manufacture, the one-piece Speed Grip is clinched to form a loose, cage-like box over a standard, threaded nut. Two sides of the Speed Grip are open, with two lips bent over to retain the nut. The Speed Grip is formed around the other two sides and the ends are clinched underneath to form two opposing spring steel prongs. When the Speed Grip is attached to a sheet metal panel, one prong is inserted into the square hole and the other snapped into place. No wrench is needed to hold the nut in place while the bolt is tightened.

The Speed Grip finds use for blind location attachment. The nut within the Speed Grip "floats," compensating for slight misalignment and preventing cross threading.

### C-38—New Model Outboard Motor

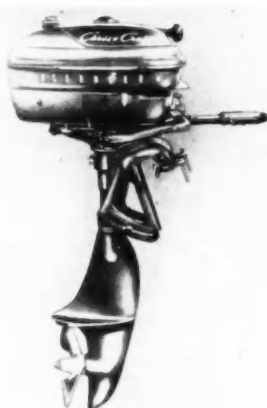
The Chris-Craft Corp., Algonac, Mich., announces volume production of a new Challenger outboard motor for 1949 weighing 46 lb, which is an alternate-firing twin with 9.42 cu in. displacement developing 5½ horsepower at 4000 rpm. The motor has a 360 deg



For additional information regarding any of these items, please use coupon on page 60.

swivel with cam-operated lock in reverse, and comes complete with safety chain link. The new model is said to assure split-second starting, with better performance and flexibility in all speeds, —from trolling range to fast cruising.

The new motor is provided with anti-friction ball-bearing starter, having ball-bearing engagement between motor and starter. A simplified control panel has all units centralized for visibility



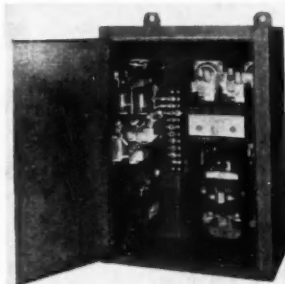
Chris-Craft Champion model J8J outboard motor

and finger-tip operation. Steering is selective and adjustable in a complete range from easy-touch operation to automatic helmsman control for a set course. The carburetor has permanently calibrated controls and a flood-proof-type choke to aid even the most inexperienced operator.

The streamlined, one-piece, under-water unit is designed for minimum cavitation and is cast out of high grade heat-treated aluminum alloy. Aluminum parts are alodined to protect the aluminum and anchor the finish, particularly against salt-water corrosion. For corrosion protection also, the propeller shaft is made of Monel metal. A special Chris-Craft weedless propeller is used. Propeller dia is 8¾ in. with pitch of 8, two blades having rotation left hand.

### C-39—Dwarf Control Welder Combine

A dwarf control combination for small welders, Model 106-53BA1, has been developed by the Weltronic Co., Detroit.



Weltronic dwarf control welder combination, model 106-53BA1.

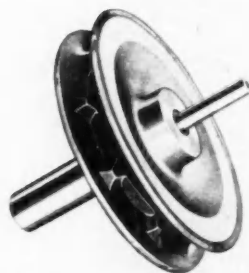
Comprising a NEMA 1A timer plus a high speed magnetic contactor, standard models mount to the right-hand side of the welder. Control panel is placed so controls face the operator.

The control is enclosed in a cabinet measuring 17 in. high, 14½ in. wide, and 8 in. deep. A package unit, the control is completely wired and ready to install.

The high speed magnetic contactor, installed in a shock mounting, is available in 100 or 150 amp size.

A single stage weld timer with continuous adjustment from 3 to 120 cycles, provides a weld-no weld switch on the panel. Timer power supply operates from 115, 230, or 460 volt AC source. Units for other voltages or 25 cycle operation may be supplied.

### C-40—Pulley for Raising Freight Car Racks



A special pulley and shaft for raising racks in automobile freight cars is being produced by the C. D. Caulfield Co., New Britain, Conn. The large end of the shaft fits a hole in the freight car wall, the pulley meshes with a hand chain, and a heavy duty electric drill—one-half in. capacity or larger—is attached to the small end of the shaft. When the drill is started the racks can be lifted in less than five minutes with only one man to operate the drill, according to company claim.





## How To Cut Your Steel Requirements

# 25%

**Squeeze the "DEAD WEIGHT" out of Your Product**



You can eliminate the extra tons which add only dead weight to your product by using Inland HI-STEEL instead of ordinary structural grade carbon steel. HI-STEEL has nearly twice the working strength of ordinary structural grade carbon steel, and 50% greater ability to stand up under impact loads. That's why, with HI-STEEL, it is practical and safe to reduce sectional thicknesses—cutting your steel tonnage requirements approximately 25%. In addition to its high strength-to-weight ratio, HI-STEEL has about five times the atmospheric corrosion resistance of ordinary carbon steel and is far more resistant to abrasion. Write for booklet. Inland Steel Co., 38 S. Dearborn St., Chicago, Ill. Sales Offices: Chicago, Davenport, Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis, St. Paul.

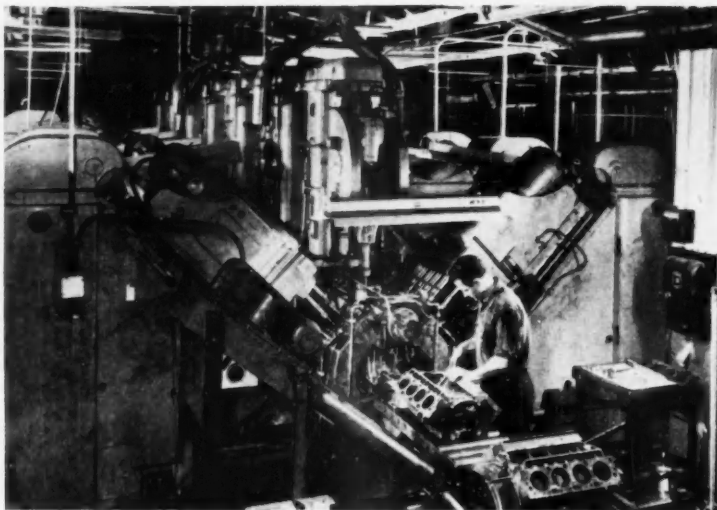
*HI-STEEL meets the requirements of SAE Specification 950*

**INLAND  
STEEL**

# INLAND HI-STEEL

Reg. U. S. Pat. Off.

**THE LOW-ALLOY HIGH-STRENGTH STEEL**

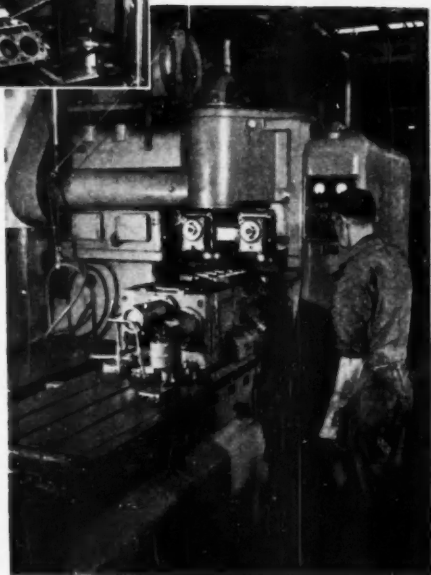


Six-station, unit-type transfer machine in which each unit is self-contained. It produces a total of 207 holes in the cylinder head joint faces, including tapet holes, distributor holes, etc. This machine too is so designed as to make possible conversion to accommodate changes in product design.

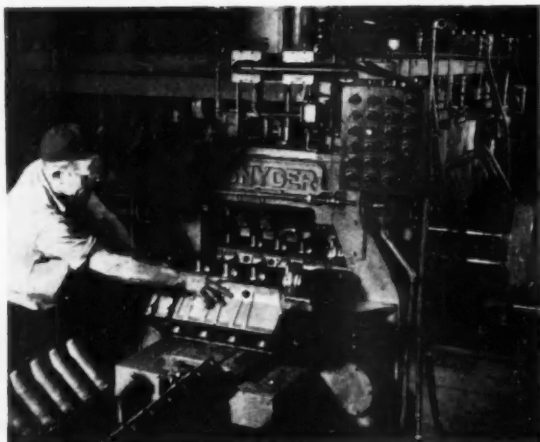
## Cadillac's Special Machines

### *for Cylinder Block Production*

**A**N INTERESTING description of the advance planning for machining the cylinder block of Cadillac's 1949 V-eight overhead valve engine was given in the article, "How Tooling Problems Were Decided," by Harold G. Warner, in the Nov. 1, 1948 issue of *AUTOMOTIVE INDUSTRIES*. On this page is shown a sampling of some of the outstanding items of new equipment mentioned in the article.



Heavy duty milling machine for milling the oil pan face together with a shallow slot which serves later as the main bearing location. The machine is arranged to rough- and finish-mill in one pass. Among its major features are: ruggedness, freedom from dimensional variation, heavy stock removable ability, and the possibility of adaptation to future design changes.



View of the first station of the unique six-station automatic transfer machine designed for line boring cam and crank lines. The horizontal boring heads mounted on each side of the main fixture may be seen in this illustration. Line boring of both bearing lines was decided upon because of the relatively close spacing of the five main bearings. In addition to boring, the machine simultaneously drills the two long main oil galleries and counterbores them at both ends.

# Stretch-Straightening- Detwisting Machine for Shapes and Sections

Built by  
**HYDROPRESS, INC.**  
New York, N.Y.

## Another COST-CUTTING Application of **VICKERS HYDRAULICS**

Powered by Vickers Hydraulic Power Units and controlled by Vickers Hydraulic Valves, this huge machine performs detwisting and straightening operations on structural members as long as 40 feet and with cross-section lying within a 14 inch diameter circle. The stretch-straightening and detwisting operations are performed simultaneously so that torsion is applied while the section is under tension and ready to flow. The torsional and tensional stresses are sufficient to obtain immediate flow and permanent detwisting of the material with a minimum of spring back

that would occur to a great extent if torsion were applied alone.

An important feature of the machine is the arrangement of movable heads that makes it possible to detwist any part of the member if localized detwisting is necessary.

This is another of the innumerable jobs throughout industry that is being done better, faster and at less cost with the help of Vickers Hydraulic Controls. Consult the Vickers office near you for information on how Vickers Hydraulic Equipment can improve your machinery.

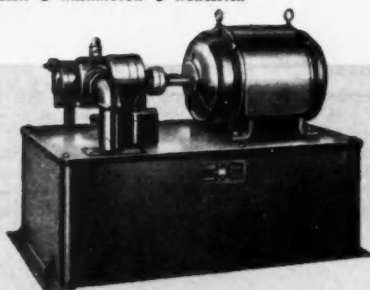
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### VICKERS HYDRAULIC POWER UNIT

A compact hydraulic power package that simplifies hydraulic system design and reduces costs. Available with various pump combinations to meet wide range of requirements up to pressure demands of 2000 psi. There are 92 standard sizes and types of single stage, two stage and dual pressure pumps equipped with motors from  $\frac{3}{4}$  to 20 hp. Ask for Bulletin 46-43.



# NEWS of the AUTOMOTIVE INDUSTRIES

(Continued from page 23)

fighters. Smaller but heavier than its predecessor, the F-61, the F-89 has a design gross weight of over 30,000 lb. It is approximately 50 ft long and has a wing span of approximately 50 ft. In addition to the F-89 production order, Northrop is currently engaged in converting 10 propeller-driven Flying Wing B-35 bombers to jet propulsion, and is manufacturing 23 C-125 Raider assault transports.

## **GE Completes First J-47 Jet at Lockland, O., Plant**

The first J-47 jet engine to be produced at General Electric's new Lockland, O., plant has been tested and shipped to the USAF. The J-47 has been in production for more than a year at GE plants in Lynn and Everett, Mass. Leased by GE less than eight months ago, the Lockland plant is owned by the Electric Auto-Lite Co.

## **Bell to Build 9 Helicopters for the Navy**

The Bell Aircraft Corp. has received a \$634,000 order from the U. S. Navy for nine HTL-3 helicopters, new and refined versions of the commercial model with stepped-up horsepower. The order comes at a time when Bell is completing the building of about 70 helicopters ordered for the Army Ground Forces. Bell, which recently received a subcontract in excess of \$75 million from the Boeing Airplane Co., is also building 13 large YH-12 helicopters, and three two-place XH-15 helicopters for the Army.

## **Fly Martin AM-1 Mauler With Over 25,000 lb Gross Weight**

A Martin AM-1 Mauler, single-engine Navy attack plane, recently flew with a total gross weight of over 25,000 lb on a routine test flight. This is believed to be the heaviest gross weight ever flown by a single-engine aircraft. The AM-1 is powered by a 3000-hp version of the Pratt & Whitney Wasp Major (R-4360) engine. About two-thirds of the 149 Maulers ordered by the Navy have been delivered.

## **Gasoline Sold in Summer of '48 Had Higher Octane Rating**

Regular and premium-priced gasolines sold in American service stations during the summer of 1948 had higher octane ratings than those sold during the two preceding summers, according to the Bureau of Mines semi-annual survey of motor fuels.

The report, based on analyses of 2997 samples of gasoline from 17 marketing areas throughout the nation, shows that the octane ratings of regular gasolines sold in the summer of 1948 averaged 75.2 compared with 75.1 for the summer of 1947 and with 74.4 during 1946. Similarly, the ratings of premium-priced gasolines last summer averaged 79.5 as compared with 79.2 during the previous summer and with 78.3 and 74.9 respectively, for the two preceding summers.

## **Fairchild Licenses Continental to Use Al-Fin Process**

The Fairchild Engine and Airplane Corp. has announced the signing of a license agreement covering the use of its Al-Fin bonding process by the Continental Motors Corp. J. Carlton Ward, Jr., Fairchild board chairman, said that Continental will use the process in manufacturing a new series of lightweight, aircooled gasoline engines designed to power U. S. Army tanks, gun carriers, trucks, and other ordnance vehicles. The Al-Fin process, which chemically bonds aluminum or aluminum alloys to steel or iron, will be used to attach aluminum cooling fins to the cylinder barrels.

## **Wood Made Assistant To Chevrolet Chief**

John G. Wood, who has been chief engineer of GM's Chevrolet Motor Div., has been appointed executive assistant for engineering to W. F. Armstrong, general manager. He was made chief engineer for Chevrolet in June, 1945, and prior to that time had been assistant chief engineer for 12 years. He is succeeded by Edward H. Kelley, who has been assistant chief engineer.

## **Belgium Holds International Car Show, Jan. 22-Feb. 2**

Belgium's International Automobile Show, held in the Palais du Cinquantenaire, Brussels, from Jan. 22 to Feb. 2, was marked by the first European appearance of the Chevrolet luxury sedan, a car which evoked favorable comment because of its improved styling. The show, which was devoted to all types of automobiles and automotive equipment, was marked more as a commercial rather than as a technical display. Practically all of the models had been seen at earlier European exhibitions.

As the national automobile industry has practically ceased to exist, Belgium is an open market in which all manufacturing companies compete

equally. The U. S. holds the lead in imports with 22,164 automobiles imported into Belgium in 1948. England moved into second place with 13,887 cars imported, while France took third position with 8002 cars imported.

## **McCord Names Cooper New Works Manager**

The McCord Corp. has promoted James H. Cooper from works manager to vice president in charge of engineering. He will be succeeded as works manager by Dean S. Fields, who has been assistant works manager since 1941 and who was formerly with Graham-Paige Motor Car Co.

## **Boeing Airplane Delivers First Stratocruiser to Pan Am**

The Boeing Airplane Co. recently delivered the first 75-passenger Boeing Stratocruiser-type Clipper to Pan American World Airways. This delivery is the first of an order of 20 of the new planes for Pan American, and the first of 55 Stratocruisers now being built for six major airlines.

## **Conklin Named President of Mat's Handling Institute**

J. H. W. Conklin, sales manager, Industrial Truck Div., Clark Equipment Co., Battle Creek, Mich., was elected president of the Materials Handling Institute at the annual election of officers held in Philadelphia.

## **Correction for Article "Warner Gear Expands"**

Referring to the article, "Warner Gear Expands" AUTOMOTIVE INDUSTRIES, Jan. 1, 1949) attention is drawn to the fact that the crown shaving of gear teeth of overdrive pinions is done on one gear at a time rather than two at a time as stated in the article. These pinions are hobbled two at a time on an arbor but shaved singly.

## **Correction for Basic Screw Thread Tables**

In Table 1 and Table 2 of the article, "International Accord on Unified Screw Thread Standards," published in the Jan. 1, 1949, issue of AUTOMOTIVE INDUSTRIES, column E was listed as the Basic Major Diameter, which was in error. Instead, column E should have been headed—Basic Pitch Diameter.

*If it's assembled with  
Form-A-Gasket  
it's  
Leak-proof!*



PERMATEX COMPANY INC., BROOKLYN 29, N. Y.



## PUBLICATIONS AVAILABLE

Publications listed in this department are obtainable by subscribers through the Editorial Department of AUTOMOTIVE INDUSTRIES. In making requests please be sure to give the NUMBER of the item concerning the publication desired, your name and address, company connection and title.

### A-45—Milling Cutters

Cincinnati Milling and Grinding Machines, Inc.—A new booklet, *Look Sharp at Your Cutters*, which is an excellent guide for anyone concerned with grinding milling cutters. This book contains practical data in tabular and chart form concerning correct sharpening as well as the correct cutting speed and feeds to be used. These data represent a limited number of excerpts from the Company's many publications devoted to cutter sharpening practice and high-speed steel and carbide milling practice.

### A-46—Silicone Rubber

General Electric Co. Chemical Dept.—A new 24-page illustrated bulletin (No. CDP-584) devoted to the heat-resistant, mechanical, electrical, and chemical resistant properties of G-E silicone rubber, as well as applications for the material. The bulletin discusses fundamentals of silicone chemistry and the performance of the rubber under varied conditions. Property tables are included for reference.

### A-47—Wire Rope

Jones & Laughlin Steel Corp.—A pocket-sized handbook titled, *Wire Rope*

*Is A Machine*, which explains how wire rope works, how it should be operated, and how to select and order correct wire rope construction for long service life on the job. It has a catalog of standard J&L wire rope constructions; standard fittings, slings, and splicing service available with J&L wire rope; and general recommendations for ropes in use on standard equipment. Included in the catalog section are tables of weights and strengths. Vital statistics on rope end attachments are included in the section on standard fittings, slings, and splicing service.

### A-48—Vertical Pull-Up Broaching Machines

American Broach & Machine Co.—A 12-page, three-color circular, Number 400, covering the complete line of American vertical pull-up broaching machines. Included are specifications and features of the newly developed small size VP 2-8-24 machine which was designed to provide a low cost unit for the production of various internal broaching operations when the particular operation doesn't require the full stroke or tonnage of the larger machines. A wide range of internal operations are pictured in addition to the

continuous units that are equipped with special loading magazines and hydraulic table slides which transfer the work pieces to broaching position.

### A-49—Speedomax Instruments

Leeds & Northrup Co.—The Company's complete line of Speedomax instruments—indicators, indicating recorders, and recording controllers—is described and illustrated in a new 44-page catalog. Called *Speedomax Type G Instruments*, the publication describes these high-speed, high-sensitivity instruments for all the uses for which they are now available. Illustrations in the catalog include: close-ups showing design features; schematic diagrams of the Speedomax potentiometer and Wheatstone bridge circuit; and full-size, full-color sections of a round chart and a strip-chart, with the type of record available for each.

### A-50—Solenoid Controlled Valves

Vickers, Inc.—The series DG solenoid controlled two, three, and four-way directional control valves, an addition to the line of hydraulic control equipment, are described and illustrated in Bulletin 48-27. Features of the new valves include compactness, small solenoids, low inrush and holding current, and open, closed, and partially blocked valving modifications.

### A-51—Jig Borers

Pratt & Whitney—A 32-page catalog which describes and illustrates the P&W jig borers as well as additional equipment (Turn to page 92, please)

**TIME SAVER COUPON** for your convenience in obtaining, **WITHOUT OBLIGATION**, more information on any one or more of the publications described above **OR New Production and Plant Equipment OR New Products** items described on other pages.

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Your Company Connection or Business .....

Address .....  
(Street & No.) (City) (Zone) (State)



# Adding compressibility to rubber cuts sealing costs on rigid joints

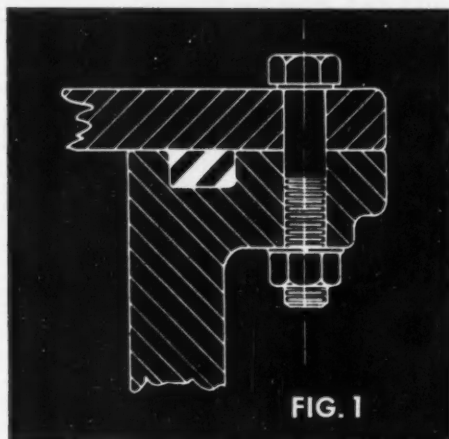


FIG. 1

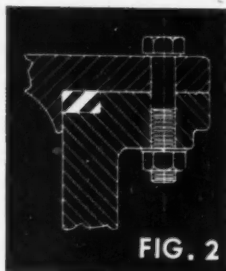


FIG. 2

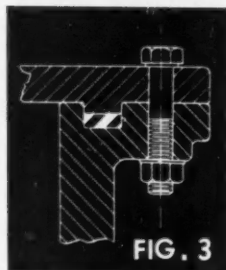


FIG. 3

**Effective, low-cost sealing** of rigid, metal-to-metal joints calls for a gasket, simple in shape, that will completely fill its recessed channel without requiring excessively close gasket tolerances.

Because Armstrong's cork-and-rubber gasket materials combine the natural compressibility of cork with the sealing properties of rubber, they are ideally suited to this type of application. Most of these cork-and-rubber compositions will compress up to 33% with no appreciable side flow. Hence close tolerances on gaskets are unnecessary. And no relief is needed to accommodate side flow.

To most fluids, cork-and-rubber compositions offer about the same resistance as comparable straight synthetics. And because cork-and-rubber rings can be lathe-cut from tubes, gasket costs on the larger sizes (10" to 20" O.D.) usually are less for these more expensive compounds than would be similar parts die-cut from cork composition sheets.

Figure 1 shows a typical rigid gasketed joint. In such applications, a straight rubber gasket may overflow the channel. Or it may fail to fill the channel sufficiently to provide a tight seal. Cork-and-rubber, on the other hand, permits the use of oversized gaskets that compress into the channel and fill it completely. The absence of side flow makes it easy to mate flanges perfectly.

For the flange shown in figure 2, a cork-and-rubber composition is modified to provide a controlled amount of side flow. Thus, this gasket insures a tight seal against the side as well as the top.

The high pressure flange shown in figure 3 utilizes a stop to prevent blowouts. Perfect mating of flanges is assured with a cork-and-rubber gasket.

We urge you to discuss your applications with your Armstrong representative. Methods and materials he may suggest may help save production time and help reduce costs.



## Send for this Gasket Handbook

You'll find useful application and specification data in the new, enlarged 24-page booklet, "Armstrong's Gasket and Sealing Materials." It contains up-to-date data on synthetic rubber, cork-and-synthetic-rubber, cork composition, and fiber sheet sealing materials.

This booklet includes ten technical discussions of the factors influencing

modern gasket and joint design. It also suggests methods of putting Armstrong's stock materials to specialized uses in such fields as radio, electrical, automotive, petroleum, and transportation industries. Also included are typical applications and current government specifications.

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GASKETS • PACKINGS • SEALS

# PERSONALS

Recent Personnel Changes and Appointments at the Plants of the Automotive and Aviation Manufacturers and Their Suppliers.

Gar Wood Industries, Inc.—**Edward F. Fisher** was elected president to succeed **Charles W. Perelle**, who resigned.

General Motors Corp., Motors Holding Div.—**Herbert M. Gould** has been appointed general manager. Mr. Gould, assistant general manager of the Divisions since 1936, succeeds **Albert L. Deane**, who is retiring after 30 years' service with General Motors.

Thompson-Bremer & Co.—**Henry T. Chamberlain** has been elected president succeeding **Arthur H. Thompson**, founder of the company, who has been elected chairman of the board of directors. Other officers elected were: **William J. Dunn**, vice-president; **Joseph M. Griffen**, secretary, and **Walter M. Neuman**, comptroller.

Electric Auto-Lite Corp.—**H. R. Butts** has been appointed general sales manager in charge of the Merchandising Division. Mr. Butts replaces **F. A. Nealon**, who has resigned. **Kenneth L. Gackel** has been promoted to the post of assistant sales manager, Wire and Cable Division, with headquarters at Toledo.

Willis-Overland Motors—**Charles S. Dennison** has been appointed assistant general sales manager. **E. L. Anderson**, former field representative for the Southwest, has been named the company's sales promotion manager to fill the position vacated by **Dennison**.

**F. F. Baldwin**, former Midwestern field representative, has been placed in charge of the truck section of the truck and equipment sales department.

Clearing Machine Corp.—**John R. Bartizal**, formerly treasurer of the Corporation, has become executive vice president.

General Motors Corp., Customer Research Section—the appointment of **Roland S. Withers** as director of the section has been announced.

Studebaker Corp.—**Lloyd F. Hillring** has been appointed export engineer. Mr. Hillring succeeds **Thomas L. Cowles**, under whom he served as assistant and who has retired after 20 years with Studebaker.

Bendix Aviation Corp.—**Kenneth G. Gano** has been appointed sales manager of the Skinner Purifiers Division of the Corporation.

Superior Steel Corp.—**Fred L. Fox** has been appointed as assistant general manager of sales in charge of clad metal sales.

American Steel & Wire Co.—**William I. Ong** has been appointed assistant to the president.

General Motors Corp., Pontiac Motor Div.—**Ray E. Markusen** has been promoted from publications editor to assistant advertising manager for the division and **Dan O'Madigan, Jr.**, has been named assistant general sales manager.

Standard Products Co.—**C. O. Richards** has been appointed to the position of general sales manager over all divisions of the Company.

Sun Oil Co.—**John C. Agnew** was elected secretary and treasurer and a director. Mr. Agnew, who was assistant secretary and assistant treasurer, succeeds **Francis S. McIlhenny, Jr.**, who resigned last month.

Norton Co.—**John N. Brickman**, formerly field engineer, has been appointed abrasive engineer in an additional territory recently created in the city of Chicago.

Federal-Mogul Corp.—Four new vice presidencies have been created. **M. A. Hunter** is in charge of manufacturing. **Ernest R. Darby** is in charge of research, **Roger I. Marquis**, in charge of industrial relations, **Neil A. Moore**, in charge of Federal-Mogul Service Division.

Plymouth Motor Corp.—**M. L. Van Dagens** has been named technical service manager and **R. C. Koenig** has been appointed distribution manager of the Evansville, Ind., plant.

B. F. Goodrich Co.—**Donald W. Gates** has been appointed manager of advertising and sales promotion in the Associated Lines Sales Division. He succeeds **Jay E. Miller**, who has been named to a recently created post as western public relations manager with headquarters in Los Angeles. **Everett C. Shingleton** has been named assistant product man-

ager for automotive, industrial and farm services tire sales in the Automotive, Aviation and Government Division. He succeeds **Delmar C. Homes**, who has been transferred to the division's New York district. **Clyde D. DeLong** has been named manager of the Plastics Products Sales Department. **Chester F. Conner** has been appointed manager of the Industrial Products Sales Department of the Industrial and General Products Division.

Fuller Manufacturing Co.—**J. Seton Gray**, president of the Company for the last 14 years, was named chairman of the board of directors. Succeeding Mr. Gray as president is **E. L. Ludvigsen**, formerly vice-president and general manager of the Transmission Division. **Harold E. Brey**, formerly vice-president and general manager of the Unit Drop Forge Division, was named executive vice-president. **William E. Ninness** is now vice-president in charge of sales, and **Thomas Backus**, vice-president in charge of engineering. **Frank C. McManus**, formerly factory manager at Kalamazoo, has been named manager of the Transmission Division, and **E. L. Block** was appointed manager of the Unit Drop Forge Division.

Thompson Grinder Co.—**John C. Wilson** has been elected to directorship and appointed vice-president in charge of sales. In his various positions Mr. Wilson continues to supervise advertising.

American Brake Shoe Co.—**Harry D. Sweeney** has been appointed sales manager of welding products for the American Manganese Steel Division. He formerly held the position of sales engineer.

White Motor Co.—**Noah O. Gresham** has been named wholesale manager in the Kansas City Region and **Earl H. Lewis** has been named Rochester branch manager.

Fram Corp.—**Arthur F. Pettet** was appointed general manager of Fram Corp., East Providence. **David C. Buell** has been named general production manager. **Bruce C. Miller** succeeds Mr. Buell as general purchasing agent.

Firestone Tire and Rubber Co.—The following directors were re-elected: **Harvey S. Firestone, Jr.**, chairman; **John W. Thomas**, honorary chairman; **Lee R. Jackson**; **John J. Shea**; **James E. Trainer**; **Harvey H. Hollinger**; **Russell A. Firestone**; **Leonard K. Firestone**; **Raymond C. Firestone** and **Roger S. Firestone**. The officers of the Firestone company were re-elected and, in addition, **Raymond C. Firestone** was elected vice-president of the company.

Radiator Specialty Co.—**George V. Hunter** was appointed advertising manager.

## Necrology

**Arthur T. Waterfall**, 79, former acting president of Dodge Bros., Inc., and former president of the Michigan Manufacturers Association and the American Foundryman's Association, died on Jan. 28 in Detroit.

**Walter R. Leuschner**, 70, reportedly the designer of the first German automobile; a retired employee of GM's Fisher Body Div.; and designer of the master Napoleonic coach for Fisher Body, died on Jan. 28 in Detroit.



## Teamwork in Horsepower Production

Automotive engineers and Sealed Power engineers have been pulling together since 1921—with incredible results to the industry and to our owners.

During the frantic years when our manufacturers devoted every effort to building war machines, Sealed Power was able to supply replacement parts to keep home transportation rolling. Today's Sealed Power staff and facilities are the finest in our 28-year history. You are urged to use all our resources to help make your good engines even better.

SEALED POWER CORPORATION  
BUTTE, MICHIGAN



# Sealed Power

PISTON RINGS · PISTONS  
CYLINDER SLEEVES

## NEW PRODUCTION EQUIPMENT

(Continued from page 51)

### B-36—Portable Infra-Red Oven

A portable infra-red oven, adapted to dry any shape of article by reason of its adjustable rows of lamps, is offered by the Wil-son Corp., Chicago, Ill.

Transportation of this "Instant-Shape" oven is accomplished by backward-tilting it and rolling it along by its up-rights, wheelbarrow fashion. When positioned, non-skid front feet prevent the oven from creeping. In use, maximum infra-red heating efficiency is secured by shaping the entire lamp assembly as desired. Adjustment permits rows of the lamps to be formed into a complete circle, with top and bottom rows brought together.

The oven uses R-40 high efficiency reflector lamps, slightly staggered for absolute evenness of heating. The backs

of the lamps are totally enclosed with combination metal and asbestos panels to eliminate heat loss. Units are available in sizes having from 3 to 10 rows.

### B-37—Hydraulic Surface Broaching Machine

The new variable speed hydraulic standard double ram vertical surface broaching machine redesigned by the Lapointe Machine Tool Co., Hudson, Mass., provides a heavy duty double tip-down fixture and a new low pressure hydraulic system.

The double tip-down fixture permits the operator to conveniently load the work on one table, while the other table is in broaching position. Special work holding units are adaptable for either fixture, and multiple operations may be done on one set-up through the complete cycle.



Lapointe double ram variable speed hydraulic surface broaching machine.

The low pressure hydraulic system introduces smoother operation for accurate broaching, eliminating excess vibration and high pressure shock.

A simplified speed control improves performance for every type of broaching. A separate automatic force-feed system constantly lubricates the ways and other moving parts. A safety switch stops the machine if the oil level in the lubricating reservoir drops below the safety point. A larger oil reservoir, in addition to special control circuit design, tends to keep oil at a normal operating temperature.

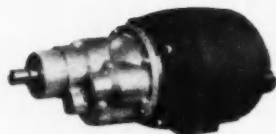
Capacities rate from 3 to 32 tons having 30 to 66 in. stroke. Overload capacity has been increased 35 per cent above rated tonnage.

(Turn to page 72, please)

## Special ENGINEERING

important factor in good performance of

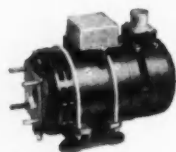
**Lamb Electric**  
MOTORS



Light-weight universal motor with efficient spur gear speed reducer.



Ruggedly designed motor with triple thread worm gear reduction for vending machines, advertising displays and similar applications.



Aircraft hydraulic pump motor with maximum output, minimum weight. Adaptable to many heavy-duty industrial applications.

Thorough study of a product and its operating conditions is the preparatory step in the design of Lamb Electric Motors.

The next step is translating this information into the electrical and mechanical characteristics required for the particular application.

This special engineering, backed by exacting manufacture and rigid inspection and testing, provides the high standard of performance for which Lamb Electric Motors are known.

THE LAMB ELECTRIC COMPANY  
KENT, OHIO

**Lamb Electric**  
SPECIAL APPLICATION FRACTIONAL HORSEPOWER MOTORS



## \* How to raise gears to live and work together

**H**ERE'S A PAIR of twins and a set of "quads" born and raised to live long and work well as a team. They come from a long-lived family of products that has earned a reputation for staying on the job. "Double Diamond" is the name.

No one factor is responsible

for this. Rather it is the hard day-to-day job of holding to one set of standards in *all* manufacturing processes. Each individual Double Diamond employee knows that his job is just as important as any other to the performance of the final product. That's our idea of the

way to make gears. And if gear performance has a bearing on the performance of your products, on the integrity of your trade mark, we'd like to do business with you.

A letter or phone call will place our engineering department at your service.



Made by  
**Automotive Gear Works, Inc.**  
RICHMOND, INDIANA

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FARM EQUIPMENT AND GENERAL INDUSTRIAL APPLICATIONS .....



HYPOID BEVEL



SPIRAL BEVEL



FLYWHEEL GEAR



ZEROL<sup>®</sup> BEVEL



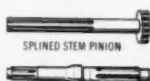
STRAIGHT BEVEL



STRAIGHT SPUR



HELICAL SPUR



SPLINED STEM PINION



SPLINE SHAFT

\*Reg. U. S. Pat. Off.





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***Hycar has it plus!***

**...AND THESE 8 OTHER ADVANTAGES!**

1. Abrasion Resistance—50% greater than crude rubber.
2. Extreme Oil Resistance—insuring dimensional stability of parts.
3. High Temperature Resistance—up to 250° F. dry heat; up to 300° hot oil.
4. Minimum Cold Flow—even at elevated temperatures.
5. Low Temperature Flexibility—down to -65° F.
6. Age Resistance—exceptionally resistant to checking or cracking due to oxidation.
7. Hardness Range—compounds can be varied from extremely soft to bone hard.
8. Non-adherent to Metal—compounds will not adhere to metals even after prolonged contact under pressure. (Metal adhesions can be readily obtained when desired.)

For more information, write or ask your supplier to write B. F. Goodrich Chemical Company, Dept. HC-2, Rose Building, Cleveland 15, Ohio.

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Reg. U. S. Pat. Off.  
*American Rubber*

**B. F. Goodrich Chemical Company**

A DIVISION OF  
THE B. F. GOODRICH COMPANY

GEON polyvinyl materials • HYCAR American rubber • GOOD-RITE chemicals and plasticizers



## Business in Brief

Written by the Guaranty Trust Co.,  
New York, Exclusively for AUTO-  
MOTIVE INDUSTRIES.

Generally higher business activity is indicated. Electric power production and crude oil output registered increases during the last week in January while department store sales and construction activity in the preceding week exceeded the levels recorded a year ago. Railway freight loadings and bituminous coal production, however, declined below the figures in the preceding week and the corresponding 1948 levels. The *New York Times* index of activity for the week ended Jan. 22 stands at 154.7, as compared with 154.6 in the preceding week and 156.1 a year ago.

Sales of department stores during the week ended Jan. 22, as reported by the Federal Reserve Board, equaled 230 per cent of the 1935-39 average, as compared with 244 in the week before. Sales were two per cent above the corresponding distribution a year ago, as against a preceding increase of five per cent. The total in 1949 so far reported is five per cent greater than the comparable sum in 1948.

Electric power production increased contraseasonally during the week ended Jan. 29. The output was 7.0 per cent above the corresponding amount in 1948, as compared with a similar advance of 6.1 per cent shown for the preceding week.

Railways freight loadings during the week ended Jan. 22 totaled 709,585 cars, 2.2 per cent less than the figure for the week before and eight per cent below the corresponding number recorded in 1948.

Crude oil production in the week ended Jan. 29 averaged 5,438,850 bbl daily, 19,900 bbl more than in the preceding week and 120,613 bbl above the comparable output in 1948.

Civil engineering construction volume reported for the week ended Feb. 3, according to *Engineering News-Record*, was \$209,703,000, one per cent less than the preceding weekly figure but 69 per cent above the comparable sum in 1948. The total recorded for five weeks of this year was 64 per cent more than the corresponding amount in 1948. Private construction was 115 per cent above that a year ago, and public construction increased by 16 per cent.

The wholesale price index of the Bureau of Labor Statistics during the week ended Jan. 25 declined to 153.8 per cent of the 1926 average, marking the fourth consecutive weekly decrease. The index was 0.3 per cent lower than in the preceding week and 3.5 per cent less than the corresponding figure in 1948. Prices of livestock, meat and grains again moved downward and were held to be the major cause of the decline in the general index.

Member bank reserve balances decreased \$98 million during the week ended Jan. 26. Underlying changes thus reflected include increases of \$321 million in Treasury deposits with Federal Reserve banks and \$6 million in Treasury cash, accompanied by a decrease of \$39 million in Reserve bank credit.

Total loans and investments of reporting member banks decreased \$27 million during the week ended Jan. 26. A decline of \$33 million in commercial, industrial, and agricultural loans was recorded. The sum of these business loans, \$15,351 million, shows a net increase of \$573 million, in 12 months.

# Standard for Industry

## SINCE 1899



Kester is constantly developing new and better flux-core solders. At present there are over 100,000 types and sizes, each designed to do a certain job in the most efficient manner.

Take advantage of Kester's highly specialized Technical Service. Call in a Kester technical engineer today and let him specify the solder that will enable you to do your soldering faster and better.

### Free—Technical Manual

Send for Kester's new 28-page manual, "SOLDER and Soldering Technique" . . . a complete analysis of the application and properties of soft solder alloys and soldering fluxes.



## KESTER SOLDER COMPANY

4201 Wrightwood Avenue, Chicago 39, Illinois

Factories Also At

Newark, New Jersey • Brantford, Canada

## KESTER SOLDER

## 5-W Engine Oil

(Continued from page 31)

mum of viscosity 6,000.

Immediately following the Tulsa meeting, the report of Subcommittee B, headed by H. C. Mougey, was submitted to Coordinating Research Council for further investigation. Since it was realized that CRC could not act fast enough in the immediate emergency, a group of engineers representing motor car manufacturers in the U. S. met to exchange notes while a similar session was held in Toronto under the auspices

of the Canadian Automobile Chamber of Commerce. Other sessions were held early in 1948 to exchange notes on the results of tests conducted during the winter of 1947-48, culminating in an important session held in Toronto Aug. 20, 1948, under the auspices of the Canadian Automobile Chamber of Commerce. This meeting, responsible for current ground rules, brought together representatives of the major oil companies as well as of the following auto-

mobile manufacturers: Chrysler Corp. (U. S. and Canada), Ford Motor Co. (U. S. and Canada), General Motors (U. S. and Canada), International Harvester (Canada), Reo (Canada), the Studebaker Corp. (U. S.) and the White Motor Co. (Canada).

Preceding the August meeting in Toronto, representatives of General Motors, Ford, Studebaker, and Chrysler met on April 2, 1948, to discuss the results of their tests with 5-W oil during the winter of 1947-48. The significant feature of these reports was the confirmation of positive results with the 5-W lubricant. The investigators were in agreement on the following points:

1—That 5-W oil, meeting the basic requirements laid down by the automotive engineers, would be recommended for use where ambient temperature was below -10F.

2—That this oil would be recommended specifically for use in passenger cars.

3—That because of 5-W's low viscosity, oil consumption was higher and more frequent checking of oil level was imperative.

4—That operators must be cautioned to drive at moderate speeds and with due allowance for changes in temperature which might make desirable a change in the grade of lubricant.

Meanwhile, many motor vehicle producers, including those listed here, are recording the results of widespread use of 5-W during the winter of 1948-49 and will compare notes immediately after these returns have been compiled.

To summarize the present situation, the 5-W oil is intended primarily, if not exclusively, for passenger cars. Along with high viscosity index and low viscosity the 5-W grade is naturally accompanied by higher consumption. It is anticipated that if the oil were used in truck engines, particularly in heavy duty vehicles, oil consumption may be too high for safe operation under certain conditions.

Although there is general agreement among the passenger car producers who have cooperated in this program that 5-W oil will not be harmful to the engine, some engineers are inclined to take a more conservative view and want a look at the record developed during the present winter before passing judgment. At least one heavy duty truck producer is on record, for the time being, as not recommending 5-W oil in its line of vehicles.

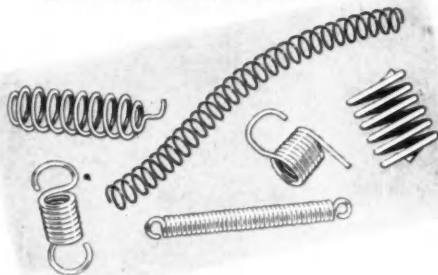
This leads to other reservations in the picture. In the first place, although Chrysler, General Motors, Ford, and several of the independents have joined hands in this recommendation, some of the other independents have not yet issued 5-W recommendations to their dealers.

At the moment the 5-W grade has no official standing as an automotive designation and is not an SAE grade. The CRC now has officially accepted the project and has started its committee

## 49 TIPS

on your

## 49 SPRINGS



In fact, there are more than 49 tips—influencing factors that will enable you to select the most practical, economical springs for your products this year.

You would be surprised at the number of manufacturers that continue through "habit" to use certain springs. The springs do a fine job so why change, they say.

The answer is that another type spring might serve the purpose equally as well—or better. It could be more economical, could improve product efficiency, could be supplied in desired quantities and could be delivered on time.

But these are the things that the Lewis Spring Engineer can quickly tell you.

Lewis Engineers have saved manufacturers hundreds, and even thousands of dollars, by helping them select the right springs at the right price. These men base their suggestions on years of experience in spring design, manufacture and applicability to products.

There is a Lewis representative near you who will be glad to offer his recommendations. There's no obligation and you may find his suggestions very profitable for you.

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**Lewis**  **PRECISION SPRINGS**  
THE FINEST LIGHT SPRINGS AND WIREFORMS OF EVERY TYPE AND MATERIAL



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**HAVE PRODUCED BILLIONS OF MILES**



**OF DRIVING SATISFACTION**



**FOR CAR, TRUCK, BUS AND TRACTOR OWNERS**



**FOR 25 YEARS**



**LONG MANUFACTURING DIVISION  
BORG-WARNER CORPORATION  
DETROIT AND WINDSOR, ONT.**

**LONG**

**CLUTCHES • RADIATORS • OIL COOLERS**

action which should lead ultimately to an SAE specification. The following is a partial list of companies who distributed their own 5-W of record some time before this article went to press:

In the U. S. A. (sub-zero winter belt)  
—Valvoline, Socony-Vacuum, Kendall,

W. H. Barber, Tidewater, Quaker State, Standard of New Jersey, Sun Oil (will supply on demand).

In Canada—Valvoline, Wakefield, Imperial Oil, Tidewater, Kendall, Sun Oil (will supply on demand), Quaker State.

## Ferguson Tractor Plant

(Continued from page 27)

washing machine, Schmiel spray booths, and the overhead-mounted Fostoria infra-red drying tunnel 110 ft in length. The terminal end of the con-

veyor loop transports the painted parts to the final assembly line. It is of interest to find that the company has adopted the one-coat synthetic enamel

finish, using a special formulation supplied by Ditzler.

At the start of the final assembly line, running at right angles to the floor conveyor are a series of off-the-floor gravity roller conveyor lines for feeding sub-assemblies to the line. These carry, respectively, the rear axle, the transmission, and engine. As mentioned earlier these parts are stored in steel bins near the point of usage. The bins are taken off the stacks by industrial trucks and placed on the feeder conveyor. Overhead, above each of these major stations is a closed rail carrying a Budgit hoist which lifts the parts from the bin and drops them in place on the assembly line.

All portable tools on the assembly line are Chicago Pneumatic air tools. They are fed from an overhead air manifold with each of the tools suspended from a counter-balance overhead.

An interesting wrinkle on the component parts painting system is that all parts for a single tractor are grouped together when loading the monorail, the sequence of hooks being arranged suitably for this purpose.

Handling of the heavy rear tires has been simplified by the use of a Ferguson designed automatic machine for tire mounting. It is located right at the point of assembly. Tires are lifted and transported to the line by means of an ingenious hoist arrangement having a chain and a long coil spring with ice tongs at its extremity. The coil spring affords a flexible means for jockeying the tire assembly into place on the axle without any manual effort.

At the end of the assembly line the engine is started and the tractor driven off under its own power to the inspection station. Here the brakes are adjusted and equalized, then front wheel alignment checked on a Bear fixture.

The capacity of the assembly line has been established at the rate of 250 units in an eight-hour shift.

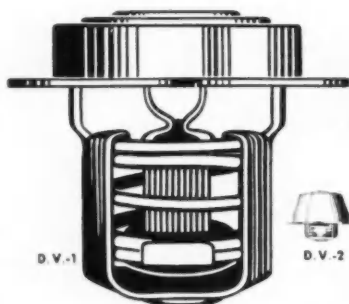
The receiving dock for incoming truck shipments boasts a special feature of unusual utility. Each dock is provided with a built-in installation of the Leva-Dock, a power-driven ramp capable of adjusting its level to suit the floor height of any vehicle—either at dock height or above or below level.

## Skip Welding

(Continued from page 46)

In the first machine the welding head is moved to operating position and retracted after the cycle has been completed, by manual control of the operator. This was done to avoid additional design complication at the start. However, the production machines now under construction will have a fully automatic cycle for operating the welding head. It is expected that each machine will be capable of producing at least 60 pieces per hour.

## Pace-Setters in ADVANCED THINKING —for Cooling System Control



D.V.-1



D.V.-2



D.V.-3



D.V.-4

## DOLE DV THERMOSTATS

Dole engineers looked into the future long before the new DV Thermostat was ready for the automotive industry. They came up with another "first" in thermostat design. Now Dole DV's are doing a real job in meeting the toughest needs for positive thermal control on modern cooling systems. They're entirely new in basic principles... and in step with advanced thinking in engine design. Dole DV Thermostats aid the automotive engineer in using smaller radiators, higher pump pressures. Broad coverage of engine specifications is provided by four basic types.



- Powerful spring controls high pump pressure
- Full seating pressure for quick warm-up
- Positive-acting, accurate thermal element for most efficient performance in atmospheric and sealed cooling systems

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THE DOLE VALVE COMPANY

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*and they still cost less!*

There's no miracle about our being able to give you bushings and bearings at substantial savings. The reason is—what might seem like a "special" to you is standard production with us.

For example, in a Formetal bushing, you can have alloys with a higher Rockwell hardness without loss of machinability. Oil grooves, oil holes or cut-outs and other special requirements can be readily engineered to your exact need.

If you use bushings or bearings... and keep it a secret... we can't help you. But if you write us, our engineering staff will tell you quickly whether or not we can save you money and improve your product. There's no obligation so why not find out today? Our handy catalog is available for the asking!

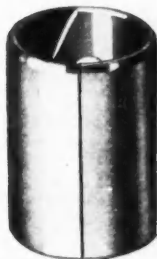
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**FORMETAL**  
*Superformed*  
BUSHINGS AND  
BEARINGS



Auto parts manufacturer replaced ordinary bushings with Formetal Superformed Bushings. Effected annual savings of \$16,800.



Auto assembly manufacturer changed to Formetal Superformed Bushings—improved performance of assembly and saved \$18,600 annually.



A motor manufacturer substituted Formetal Bearings for those previously used. Result: he saves \$13,800 annually.

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ESTABLISHED 1919

Manufacturers of "Superformed" Bushings and Bearings...and Spacer Tubes

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For those who want better prints



Model 21 Bruning Whiteprinter for moderate print production.

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BW WHITEPRINTERS**

### CHECK THESE BW ADVANTAGES

**Just plug in:** Bruning Whiteprinters plug into standard 110 or 220 outlets, depending upon the size of the machine. No special wiring required.

**No vents or exhaust fans:** The BW process is completely odorless... can be performed anywhere in the office without the slightest offense.

**No plumbing connections:** There are no pipes to connect, no water to supply or drain away. Nothing to anchor the machine to one spot.

**Wide variety of prints:** BW prints can be made on light, medium or card weight paper with black, blue, red or brown lines. Also on tinted stocks, transparent paper, film and cloth.

**A 1001 uses:** A BW unit can reproduce a letter, invoice, chart, financial report or other document as easily and quickly as it makes perfect prints from engineering drawings. It is truly a company-wide machine.

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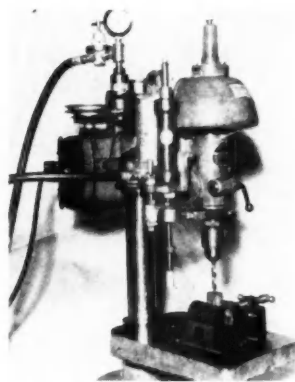
## NEW PRODUCTION EQUIPMENT

(Continued from page 64)

### B-38—Precision Feed Controller

National Pneumatic Co., Rahway, N. J., is going into production on their new Power-Check precision feed controller, which nose-mounts through a bracket attached to the moving element of any feeding mechanism, and automatically retards speed and eases pressure at any or all points of feed-travel.

If applied to pneumatic or manual drill press feed, the Power-Check can be adjusted to retard the drill during



National Pneumatic "Power-Check" precision feed controller

the whole operation, or to ease the drill through at only the breakthrough point where most drill breakage occurs. In milling and grinding operations, the Power-Check gives a precision-controlled uniform speed to eliminate destructive chatter and backlash.

This feed controller consists essentially of a hydraulic (oil) cylinder and an operating rod on which simple fittings are quickly spaced and pre-adjusted—during the "setting up" of a machine—to provide a retarding pull up to 1000 lb (with safety factor of another 1000 lb) at the desired "control" points of feed-travel. (Heavy-duty units also are obtainable.) Strength of pull is regulated by an external setting, protected by a cap. The Power-Check is completely self-contained—with no external fluid connectors or reservoirs, and the oil-filled cylinder is leak-proof.

In insuring accurate control of feed, the Power-Check automatically compensates for inequalities in the hardness of stock at the work face or at any point of penetration. The precision control also eliminates scrap produced by excessive pressure upon breakthrough.



# High Temperatures

were a problem...

**Corrosion and scaling of combustion chamber parts used to be troublesome in the Hunter Gasoline Heater . . . but that was before Hunter tried Inconel!**



Hunter cab heater, Model UH-46

**H**UNTER gasoline heaters, developed for the United States Armed Forces, gave excellent service during World War II...

But Hunter & Company wanted its post-war heaters (for trucks and buses) to be even more dependable: last even longer than the military models.

Heater service life had been limited to about 1200 hours. Corrosion and scaling had been taking its toll of metal parts exposed to the gasoline flame.

Striving to improve their product, Hunter engineers started a search for a metal that could endure the high temperature (about 1850° F.) and the corrosive atmosphere developed in the heater combustion chamber.

Knowing Inconel's reputation for thermal durability, they gave it a trial. Test parts were subjected to the direct-flame temperature of 1850° F. for 600 continuous

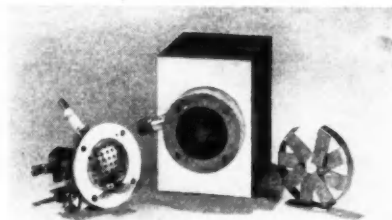
hours. At the conclusion of this severe test, the Inconel parts showed only negligible attack.

As a result, Hunter heaters are now equipped with Inconel flame-impingement pins and baffle plates.

This is but one of countless ways the family of Inco Nickel Alloys is serving industry...improving product usefulness, reducing maintenance costs. Next time you are faced with a problem that demands a "task metal"...one that will withstand corrosion, high temperature, abrasion, vibration...one that is hard, tough, stronger than structural steel, yet machinable...remember the Inco Nickel Alloys.

For further information, write for "List B"—an index to many helpful Inco periodicals and technical bulletins.

**THE INTERNATIONAL NICKEL COMPANY, INC.**  
67 Wall Street, New York 5, N. Y.



Hunter heaters are equipped with Inconel flame impingement pins and baffle plates to insure long service life.

HUNTER gasoline heaters bring you these advantages:

- Operation independent of engine
- Low fuel consumption—less than 1 pint per hour
- Automatic thermostatic heat regulation
- Continuous spark ignition
- Outside intake, providing a constantly renewed supply of fresh air

For further information about Hunter heaters for trucks, trailers, and buses, write to: HUNTER AND COMPANY, HEATING DIVISION, 1550 E. 17 St. Cleveland 14, Ohio.

**INCONEL\***...for long life at high temperatures  
(80 NICKEL—14 CHROMIUM)



# What Makes Hot Rod Engines "Hot"

(Continued from page 35)

power curves shown are for an engine of 35/16 bore and 37" stroke, or 268 cu in., with changes only in camshafts and fuel. In hot rod vernacular this engine was bored .125, stroked .125, ported, and relieved. The Edelbrock manifold carried two Stromberg 48 carburetors (dual type) and heads were 9 to 1 compression ratio. Tests were made with water pumps and two mufflers in place, but without cooling fan or air cleaners. Fuel was service station grade Ethyl gasoline except for the curve as noted,

when alcohol was used, this, of course, necessitating changes in carburetor jets. As would be expected, the more radical valve timings give greater peak horsepower and reduced torque at lower speeds.

Fig. 2B shows the BMEP comparison for this test, and a BMEP of over 130 psi from 1700 to 3400 rpm is a very creditable performance. A point of interest is that all four cams tested gave equal power at exactly 3400 rpm. It will also be noted that the semi-race

and 3/4 race cams gave identical curves. The most surprising item shown by the curves in Fig. 2A is the fact that increasing valve timing duration changed the peaking speed of the engine only 100 rpm, from 4550 to 4650 rpm. It is the writer's belief that this small gain in peaking speed is due to engine restrictions in two places: inadequate intake valve size and combustion chamber transfer area. This is borne out by test work of several other companies on similar engines. In general, it appears that modified engines of stock bore and stroke (239.4 cu in.) peak at higher speeds and develop about the same peak bhp as those with increased displacement. This seems to bear out the contention that the stock inlet valve size is inadequate for the larger engines. Figure 3 shows a power curve run by Electronic Balancing Co. on a 284 cu in. engine of 35/16 in. by 4 1/4 in. bore and stroke showing 176 bhp at 4000 rpm on gasoline. This same company has tested one engine of 239.4 cu in. which gave 211 bhp at 4800 rpm on alcohol fuel. This engine was used in the roadster which clocked 140.955, the present record.

An analysis of data supplied by Edelbrock throws some light on individual power gains contributed by each modification in itself:

Item	Bhp Gain	
	Min.	Max.
12% increase in displacement	7	20
Manifolds	6	11
Heads	12	14
Cams	16	18
Totals	35	63

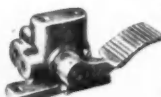
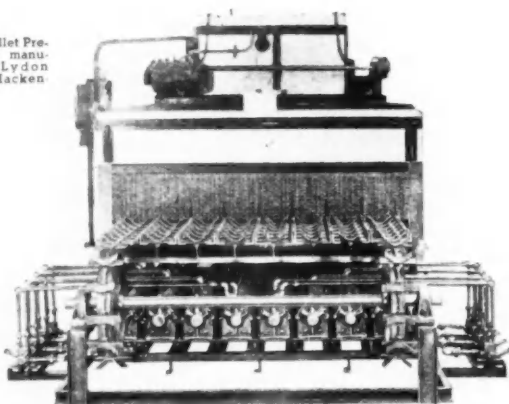
From these same data, the stock engine gave 103 bhp, so the sum of modifications should give 138 to 166 bhp. Actually, of course, the net improvement is not equal to the sum of the individual changes, but instead 178 bhp at 4650 rpm was attained with the "super" cam and on gasoline.

Most hot rod builders, as pointed out previously, use the V-8 Ford or Mercury engine, but California manufacturers of "speed equipment" now have heads, manifolds, cams, etc., available for almost every make of stock car. The Wayne head for Chevrolets is a recent addition which has already proven very successful, and accordingly is becoming quite popular. The Wayne head carries vertical in-line overhead valves, and features individual porting with six intake ports on the left side and six individual exhaust ports moved over to the right or pushrod side.

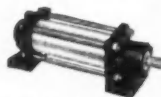
Table I gives various engine combinations with the Chevrolet, with increases in displacement possible up to 18 per cent over the passenger car size. A complete Wayne conversion includes compression ratios up to 15 to 1, intake manifolds for two or three carburetors, and a dual exhaust system. There is no provision for heating of the intake manifold. Complete Chevrolet engines modified by Wayne have circular grooves turned in the main journals of the crankshaft which is drilled for

(Turn to page 78, please)

End view of Billet Pre-Heating Oven manufactured by Lydon Bros., Inc., Hackensack, N.J.



8 Model R Foot Valves, with spring return, permit moving conveyor chains any distance up to 30'.



Nopak Model A Air Cylinders like this, with 30" strokes, are used on the Lydon Bros. Oven.

## Conveyor Chains on Pre-Heating Ovens are Powered by NOPAK...

Lydon Bros., Inc., Hackensack, N. J. . . designers and manufacturers of industrial ovens and dryers . . . employ 8 NOPAK Model A Air Cylinders controlled by 8 NOPAK Model R Foot Valves in this Billet Pre-Heating Oven, to actuate the conveyor chains which feed billets into the oven.

Each of the 6" cylinders has a 30" stroke, and is ratchet coupled to one of the conveyor chains. Thus each chain is operated independently, and may be advanced any distance up to 30' with each depression of foot valve pedal. This makes the conveyor system both flexible and selective, an important advantage in this particular case . . . Possibly a similar application of NOPAK Valves and Cylinders can help pull one of your design or production "chestnuts" out of the fire.

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VALVES AND CYLINDERS  
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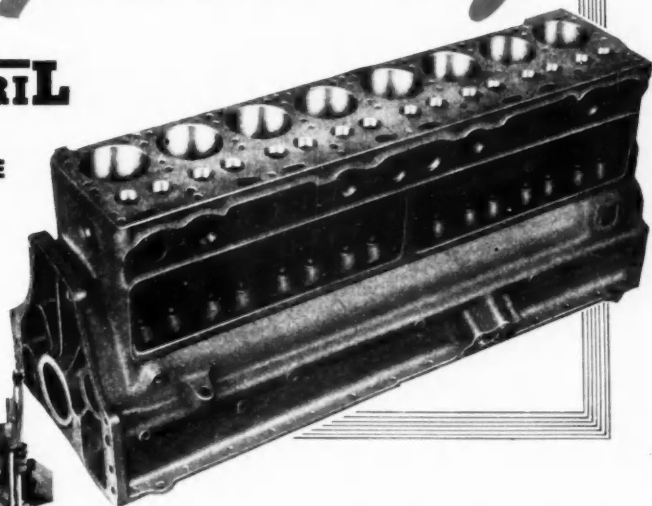
A 5528 1/2 A

# Multiple Honing

ON

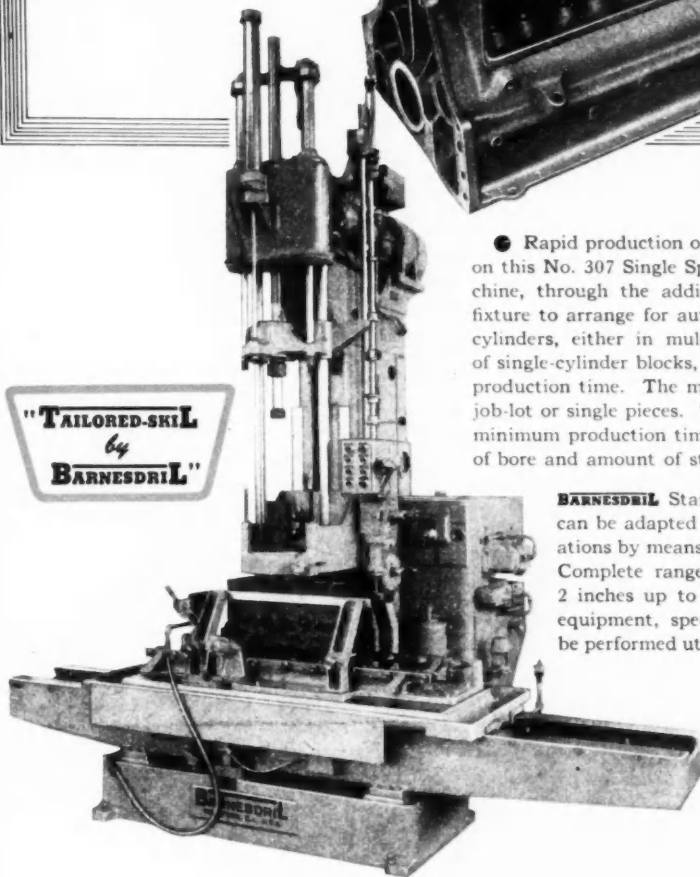
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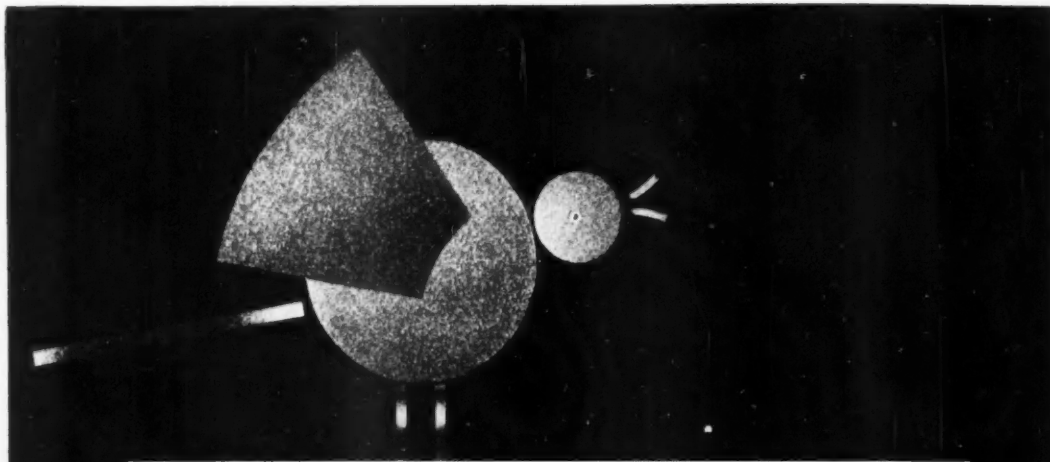
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**BARNESDRIL** Standard Single Spindle Honers can be adapted to a number of honing operations by means of this engineered flexibility. Complete range of sizes are available from 2 inches up to 40 inches. With standard equipment, special honing applications can be performed utilizing both floor space, maintenance and investment cost advantages. See your **BARNESDRIL** Representative for details in connection with your finishing operations. Ask for a copy of Series Bulletins B1409.

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They will make an on-the-spot study of your machines, your grinding methods, and the

materials which you grind. Then, from these basic facts, they will develop recommendations as to the most effective grinding wheel for your individual needs. The wheel formulas they recommend will be custom-tailored to the specific job.

**Snap thought:** Peninsular makes many types of grinding wheels, and each one measures up to the Peninsular standard—the finest it is possible to produce, the most efficient for the job at hand.

**The Peninsular Grinding Wheel Co.,**  
729 Meldrum Ave., Detroit 7, Michigan.  
**Sales Offices:** Chicago, Philadelphia, Buffalo, Cleveland, Pittsburgh, Houston, St. Louis, Cincinnati.

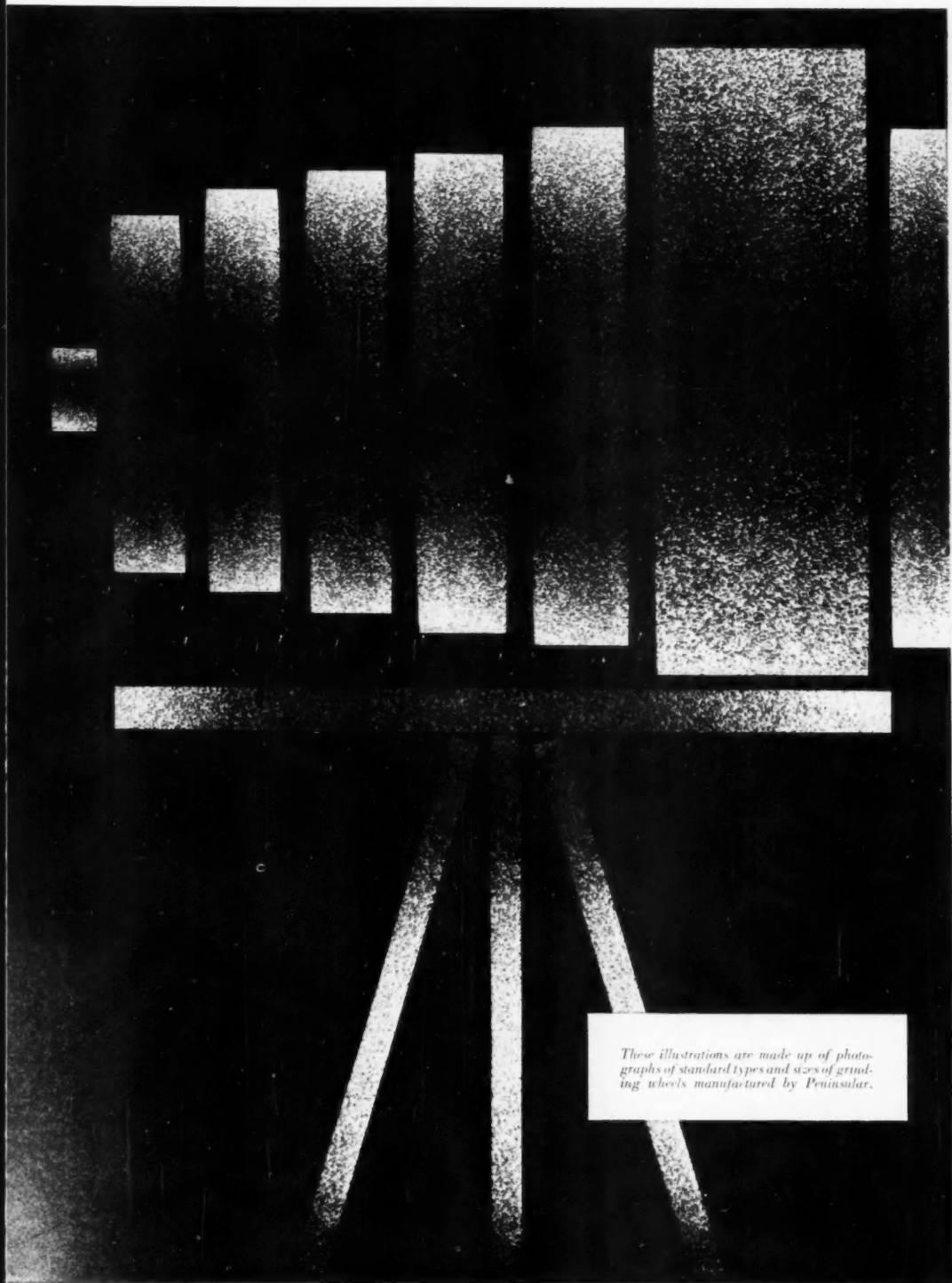
# PENINSULAR

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SPECIALISTS IN RESINOID BONDED WHEELS



*These illustrations are made up of photographs of standard types and sizes of grinding wheels manufactured by Peninsular.*



pressure lubrication to the crankpins.

The crankpins are reground to permit use of GM truck connecting rods and bearing inserts. This also gives a larger diameter piston pin which is retained in the special aluminum alloy pistons by the usual aluminum button method favored by racing engine builders. Camshafts are, of course, reground and valve springs are heavier. Tubular pushrods are supplied, and the GM truck aluminum alloy timing gear is used. A special two-coil ignition system also is provided.

No dynamometer data is yet available on the Wayne-Chevrolet engine, but a 255 cu in. engine recently clocked 134

mph in a roadster, and a speed of over 7000 rpm has been attained in second gear by a similar engine installed in a stock coupe.

The Besasie turbo-supercharger is a very interesting piece of equipment which has been successfully applied to Chevrolet engines, and, of course, solves the drive problem which has thus far been the chief obstacle to supercharger adaptations to stock cars. Data furnished show an increase in bhp of 34 per cent and a peak torque increase of 21 per cent both at approximately 500 more rpm's than stock. Supercharge pressure is 6 psi with an exhaust back pressure of 3 psi at 3600 rpm.

Knudsen equipment for the Ford six has been very successful, particularly on track racing for hot rods, and in the 225 cu in. hydroplane boat racing class where one of these conversions held the world's record at just under 90 mph until quite recently. The Knudsen racing head was probably the first to be counterbored to accommodate a raised piston head. Table 1 lists 3 sizes for this engine.

Even the four cylinder Willys has not been overlooked, and the DuVall push-rod overhead valve conversion gives approximately 80 bhp at 4000 rpm with 7.0 to 1 compression ratio.

At least a dozen different OHV conversions have been built for the Ford-Mercury 100 hp engine, ranging from rocker arm F-heads to single and double overhead cam arrangements. However, none yet is available except the Rajah with in-line valves operated by pushrods. The Ardun inclined valve head for Fords and Mercurys was described in *AUTOMOTIVE INDUSTRIES*, January 1, 1948. A unique F-head arrangement called the Smith "jiggler" is available for the smaller Ford V-8 60. It uses overhead exhaust valves to alleviate the cooling problem encountered when these engines are used in midget racing without water pumps.

Some thought might well be given to the very satisfactory performance of modified engines in late model stock sedans and coupes. The increase in piston displacement offsets the loss in low speed bhp with the result that high gear performance between 10 and 40 mph is at least equal to if not better than stock. Even with the full race cam and two dual carburetors the difference in idling would not be noticed by many drivers. While the high compression gives a different "feel," the engines are not noticeably rough. Driven reasonably, the fuel consumption is better than stock, yet real performance is on tap if desired. Of course, these observations do not apply to the really "hot" rods which run on alcohol, carry extreme valve timing, and are towed to the time trials or track.

It is also obvious that with automatic transmission developments already here or on the way, the day of good low speed torque as a goal of every passenger car engine development engineer is about over. Thus it might be indicated that passenger car engines be reconsidered as to the possibility of getting the most displacement per pound of engine, and to increasing the power and peaking speed at the expense of low speed torque. Low speed performance could then be maintained by increase in engine size either with or without gear ratio changes or automatic transmission developments. Performance, particularly acceleration at high speeds, would improve where sadly deficient at present, and fuel consumption should improve at normal cruising speeds because of higher compression and better volumetric efficiency.

## Standard on CONNECTING RODS of 9 passenger cars and 5 trucks



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hand or power drivers—may be removed and re-used. Send details of your application for recommendation and free samples. Literature on request.

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SERVICE



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plate steel  
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YOU CAN BE **SURE**.. IF IT'S  
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Now . . . for the first time . . . you can install electric motors, or motor-driven machines . . . and forget motor lubrication *for life!*

Westinghouse Life-Line . . . industry's amazing new, all-steel motor . . . now completely eliminates the biggest element in the maintenance of motors and motor-driven equipment . . . the need for periodic motor lubrication.

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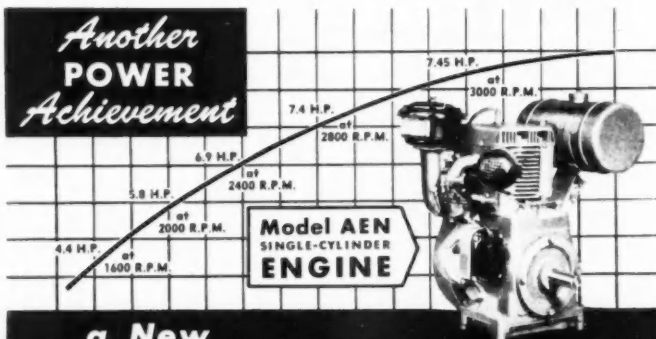
Added to Life-Line's outstanding advantages of plate-steel protection, improved windings and more compact size, *lifetime lubrication* is one more important reason for starting to convert, today, to Life-Line power. Standard ratings are available from stock—others on short delivery schedules. Ask your Westinghouse representative for price and delivery on your requirements, or write P. O. Box 868, Pittsburgh 30, Pennsylvania.

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Lower cost, more horsepower at normal speeds... less weight! Already, manufacturers and users alike are praising these features of the new heavy-duty air-cooled Model AEN 7½ hp. single-cylinder engine.

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"I like this frequently asked question. It gives us a chance to stress the economies of H-VW-M plating barrels. Our new Merlon cylinder, for instance, withstands high acid and alkali concentration and high temperature, permits loading plating cylinder and processing it directly through entire cleaning and plating cycle, eliminates the usual transfer of work load from cleaning baskets or monel cylinder to plating cylinder. Results are high speed production... low handling cost.

"We also discuss our various types of cathode contacts which meet any kind of load condition... our unobstructed cylinder for bulky pieces... our contact to stir up dense work loads... all adds up to high current efficiency. Then we point out H-VW-M's practical development for the constant replacement of plating solution in the cylinder, which means constant solution balance, consequently lower solution maintenance cost and a more uniform deposit.

"Our Plating Barrel Bulletin PB-107 covers this subject specifically. Write for your copy... and if you wish we'll be glad to discuss your problems personally at any time."



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GEORGE H. KNECHT  
District Manager  
H-VW-M Connecticut Office

## New Diamond T

(Continued from page 47)

load capacity for off-highway service. The SW456P is worm drive, while the SD462P employs double reduction drive. Both axles are provided with heavier springs.

The transmission setup consists of a Spicer 8255 five-speed overdrive, constant mesh main transmission on all models. It features an aluminum housing which effects a weight saving of 119 lb. Also supplied as standard equipment on all models is the Spicer 8031 Series three-speed auxiliary transmission, giving the vehicle fifteen forward speeds. However, when the U300-P two-speed axle is specified on the four-wheeler, the auxiliary transmission is not supplied.

Full air brakes of Westinghouse type with ¾-in. linings at the rear and ¾-in. at the front are supplied on all models, brake areas being dependent upon axle model. Auxiliary equipment consists of a two-cylinder, 12-cu ft air compressor, and two large capacity air reservoir tanks. The hand brake on all models is the heavy duty Tru-Stop ventilated steel disk type, 16-in. diameter with four shoes.

Steering is of cam-and-twin-lever type with ball bearings in the steering head, the cam follower being roller-bearing mounted. Universal joints are of latest type Spicer needle bearing design of extra large capacity.

A feature of the exterior treatment of these models is the use of heavy gage quick-detachable front fenders announced earlier. Houdaille hydraulic shock absorbers are supplied at the front.

## Making Valve Lifters

(Continued from page 45)

the specification calling for a stated amount of plunger travel in a given number of seconds under a stated load. For example, the unit in Fig. 1 is checked for a plunger travel of 0.094 in. within nine to 38 seconds with a 50-lb weight. The same fixture also measures check-ball recovery by means of an indicator gage.

Accepted units are slushed in a solution of rust-preventive oil directly at the end of the assembly line and are packed immediately for shipment to the customer.

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stamp it...  
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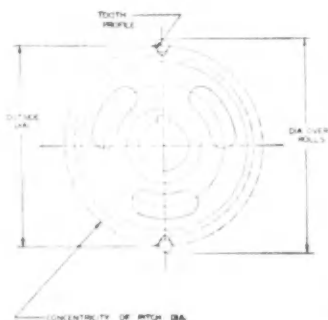
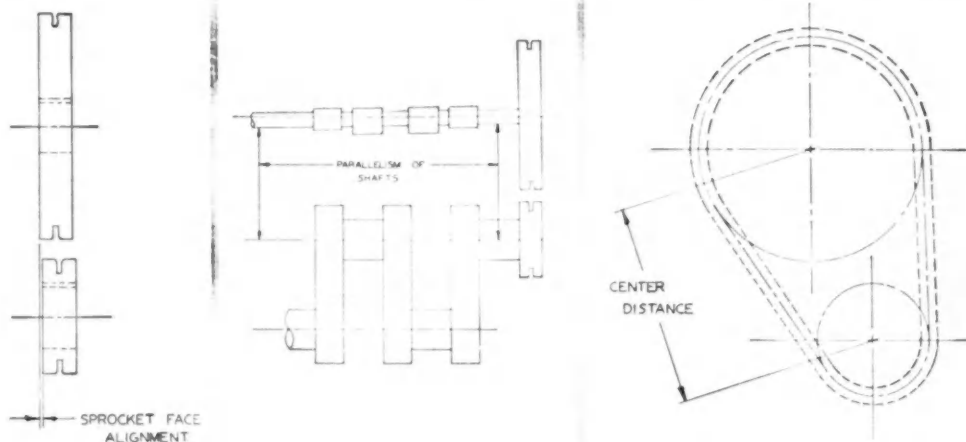
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# Morse timing drives give you design and manufacturing freedom



FOR any given timing drive, Morse Timing Chains and Sprockets give you complete freedom in designing, manufacturing, assembly, and performance.

For instance, end play of the shafts is not so critical when you use Morse Timing Chain Drives, nor does such movement affect the timing. Correct and positive timing is still maintained.

Even though camshafts and crankshafts are not perfectly parallel, Morse Timing Chain Drives give safe, sure and quiet performance.

With Morse Timing Chain Drives the center distance of the drive

is allowed a greater tolerance. This in turn permits larger tolerances on the engine block and permits economical production.

With greater manufacturing tolerances permissible on the sprockets, Morse Chain engineers can furnish a complete drive produced under the most favorable and economical conditions.

Call in Morse engineers early in the design of your new engines. Give them the opportunity of making suggestions which will save you time and money, and insure the perfect performance you require. Morse Chain Co., 7601 Central Avenue, Detroit 8, Mich.



Roller Chain Drives



Morse-Rockford Friction Clutches



Silent Chain Drives

## MORSE

MECHANICAL  
POWER TRANSMISSION  
PRODUCTS



Morse-Formspring Over-Running Clutches

MORSE CHAIN COMPANY • DETROIT 8, MICHIGAN

# Nash Simplifies Body Production

(Continued from page 30)

of its somewhat unusual configuration.

In the metal finishing department, one of the unusual operations—at least by contrast with previous practice at Milwaukee—is the assembly by spot welding of rear fenders to the body. The joint is coated with welding primer to prevent corrosion and the outer joint surface is later masked by application of the chrome belt molding.

Of the many newly tested operations, one of the most impressive is the assembly line for doors. This line starts with a power-driven conveyor flanked by four Expert multi-spot welding machines at the head end, two on each side. These units handle the welding of the reinforcement patch assembly on inner door panels. As the inner panels move along the line, operators at various stations complete the addition of

essential parts such as door glass regulators, locks, etc.

At the end of the inner panel sub-assembly line, panels are transferred onto a belt conveyor leading between a battery of six big Federal multi-spot welding machines, three on each side of the belt. Here the inner panel is joined by the outer panel and the two sections are spot welded to form the door assembly. It may be noted that each of the six Federal machines is tooled to handle a different model door.

Following Nash practice of many years standing, all bodies are Bonderized prior to painting. However, since Bonderizing and painting procedures remain substantially the same as before no further detail will be given here.

It is new, however, that prior to painting elaborate pains are taken to coat all important joints with a sealer; and that sand Mortex now is brushed on the inner surface of the floor pan and trunk floor. In fact, the job is so thoroughly done at the body plant that Nash does not contemplate the spraying of undercoating by dealers in the field.

## CALENDAR

### Conventions and Meetings

Amer. Soc. for Testing Materials Annual Spring Mtg., Chicago Feb. 28-Mar. 4  
 Amer. Soc. of Training Directors, Cleveland Mar. 2-5  
 SAE Passenger Car, Body, Prod. Mtg., Detroit Mar. 8-10  
 Amer. Soc. of Tool Engineers Annual Mtg., Pittsburgh Mar. 10-12  
 Natl. Std. Parts Assn., Regional Business Mtg., Los Angeles Mar. 16  
 Chicago Technical Soc. Council, Annual Production Show, Chicago Mar. 14-17  
 SAE Transportation Mtg., Cleveland Mar. 28-30  
 Natl. Std. Parts Assn., Regional Business Mtg., Dallas April 6  
 Metal Powder Assoc., Annual Mtg. & Exhibit, Chicago April 5-6  
 Amer. Inst. Elec. Eng. Conf., Buffalo April 11-12  
 Amer. Soc. of Lubrication Eng., Annual Show & Convention, New York April 11-13  
 SAE Aeronautics Mtg., New York City April 11-13  
 Amer. Soc. of Metals, Western Metal Congress, Los Angeles April 11-16  
 Midwest Power Conference, Annual Meeting, Chicago April 18-20  
 Salon International de l'Aéronautique, Paris April 29-May 15  
 Chamber of Commerce of the United States Annual Mtg., Washington May 2-5  
 Natl. Std. Parts Assn., Regional Business Mtg., Atlanta May 9  
 Amer. Management Assoc., Nat'l. Packaging Exp., Atlantic City May 10-13  
 Instrument Soc. of America, Annual Mtg., Toronto, Can. May 12-13  
 Soc. for Experimental Stress Analysis Mtg., Detroit May 19-21  
 Natl. Std. Parts Assn., Regional Business Mtg., Philadelphia May 22  
 Middle Atlantic Regional Automotive Show, Phila. May 23-30  
 SAE Summer Mtg., French Lick, June 5-10  
 American Inst. of Elec. Engineers, Swampscott, Mass. June 20-24  
 Amer. Soc. for Testing Materials Annual Mtg., Atlantic City, June 27-July 1  
 Amer. Electrodyn. Soc. Annual Convention, Milwaukee June 27-30  
 SAE West Coast Mtg., Portland, Ore. Aug. 17-19  
 Instrument Soc. of America Convention, St. Louis Sept. 12-16

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Analysing the Problem

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Planning Production

Tooling Up

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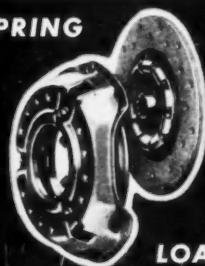
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Industrial

Mowers and Light Machines

Engines and Marine Units

Machine Tools Production Units

ROCKFORD CLUTCHES POWER TAKE OFFS

## Italy's Remarkable Comeback

(Continued from page 38)

### Extensive War Damage at Lancia

Lancia lost 70 per cent of its productive ability by war damage, according to Arturo Lancia, a cousin of the founder of the firm. This Turin automobile company is probably the only one in the world having a woman at its head. When Vincenzo Lancia died in 1937, his widow became president of the company and has devoted all her time to it ever since. She is assisted by her son, Gianni Lancia, with Engi-

neer Girella as production manager and Engineer Jano responsible for design. Before joining Lancia, Jano was with Fiat and later produced the earlier successful Alfa Romeo racing cars.

The whole of the machine shop was gutted by bombing, but has since been rebuilt and re-equipped. Seventy per cent of the war damage has been met by the firm itself. Orders for \$300,000 worth of American machine tools have been placed privately, but more are to

follow, and it is not expected that the factory will be fully equipped before two or perhaps three years. Meanwhile production is 75 per cent of pre-war.

With two passenger car models and one Diesel truck, Lancia aims at high-class products built on modern lines with the retention of earlier methods of inspection and testing. For instance, all engines are run in for two hours, given a  $4\frac{1}{2}$  hour power test and then completely stripped. Every chassis goes on the road for a 30 mile test, including mountain roads.

The two passenger car models have narrow V four-cylinder engines with detachable cylinder liners. Unit construction of chassis and body is employed, but in order to provide for custom-built bodies, there is a special "box" chassis to which a custom-built build can be welded. This makes for three assembly lines.

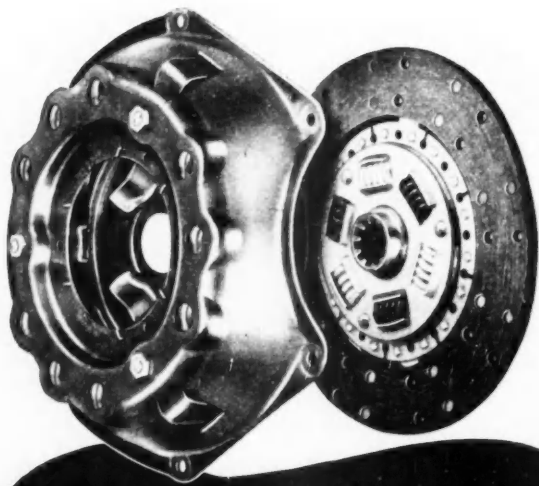
During the war part of the Lancia factory was moved to Bolzano in the high Alps and these works have been retained for part production of the Diesel truck and for aluminum castings. Because of the comparative low price of this metal in Italy, there is a most extensive use of it in the Lancia truck, notably for the crankcase, clutch and transmission housings, valve cover, timing gear cover, fan, pump housing, etc. The six-cylinder engine of 4.25 in. by 5.9 in. bore and stroke, develops 122 hp at 2000 rpm. Trailer haulage being common in Italy, the transmission provides eight speeds ahead and two reverse speeds, and compressed air brakes for truck and trailer.

### Alfa Romeo Plant Heavily Bombed

Alfa Romeo's Milan factory had some 80 bombs showered on it. The damage is still apparent, and its extent can be gaged by an examination of Citroen's assembly plant, adjoining the Alfa works, which consists of nothing more than unsafe walls and twisted girders. Despite heavy destruction, Alfa Romeo produced some cars within 15 days of the American army entering Milan. Forming a part of the industrial group known as the I.R.I., the automobile factory was granted an immediate sum of \$500,000 for reconstruction purposes. This has been spent in reconstruction on a permanent basis and not on make-shift construction. Formerly the biggest airplane engine builder in Italy, this branch is now dormant and Alfa Romeo's activities are two high-grade passenger cars of a sports type, two trucks, electric generating sets, an engine for the Ansaldo tractor, motor coaches and buses, aluminum castings, and aluminum profiling. The number of workers has dropped from 9000 to 7000.

The passenger cars are two versions of one type, a sports and a supersports model, the engine being a six cylinder of 150 cu in. with two overhead camshafts. One model has a single down-

(Turn to page 88, please)



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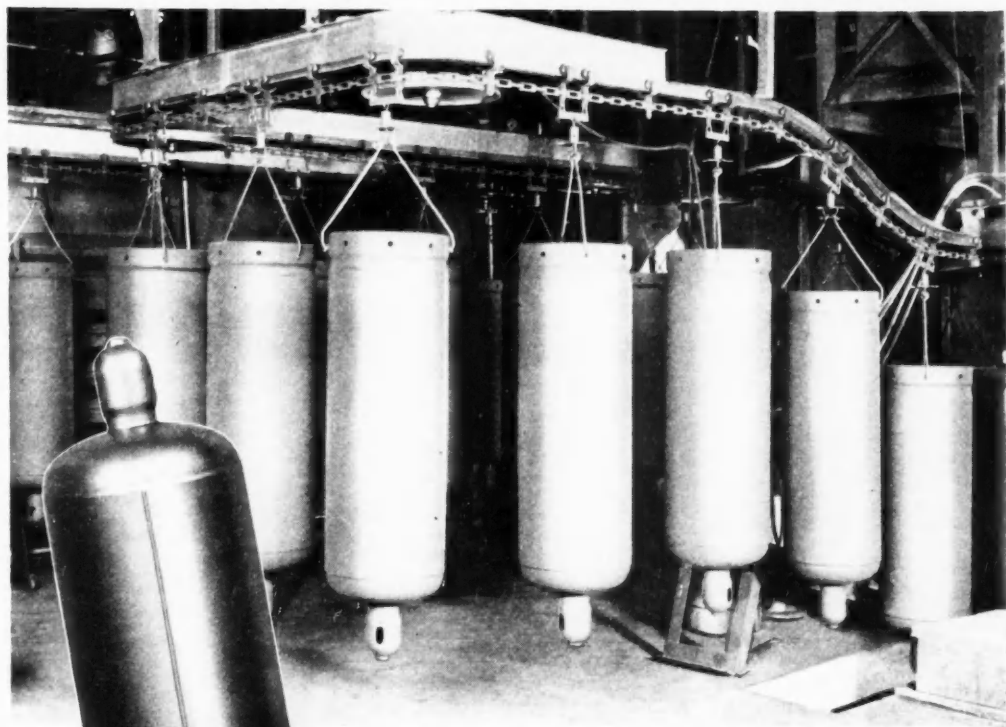
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Photographs of the Lee cylinder, courtesy of the Steel Coorporage Company, Detroit.

Because of the greater strength and excellent fabricating, welding and copper brazing properties of this low-alloy, abrasion- and corrosion-resisting steel, cylinders made with it (to conform to I.C.C. safety requirements) are 35% lighter in weight than when made with conventional carbon steel.

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## Silicone News



### Silicone Insulation Gives Rapidly Reversing Motor 10 Times Normal Life

That's significant news to designers of machine tools. Even more significant perhaps to electrical engineers is the further confirmation of our laboratory and motor test results. These tests indicated that Silicone Insulation has 10 times the life and 10 times the wet insulation resistance of Class 'B' insulation under comparable conditions.



PHOTO COURTESY COGSDILL TWIST DRILL COMPANY

Improved drill grinder depends upon DC Silicone Insulation for long trouble-free operation.

Engineers at Cogsdill Twist Drill Company of Detroit developed a unique machine for grinding drills. Instead of reversing the carriage by a conventional cam or crank, they use a 1 h.p., 1200 r.p.m. motor to reverse the carriage drive 50-60 times per minute.

In this service, Class 'A' insulated motors lasted 3 to 4 days; Class 'B' insulated motors lasted 3 to 5 weeks. After repeated failures, the reversing motors were rewound with DC Silicone Insulation by the A. H. Nimmo Electric Company of Detroit.

The motor bearings were packed with DC 44 Silicone Grease and the frame was painted with DC Silicone enamel. The motors have now been in service over 10 months and show no sign of failure. A hazardous smoke problem caused by the burning of conventional finishes also has been eliminated.

This is a typical example of how Dow Corning Silicone Insulation increases the life and reliability of hard working motors. Specifications for rewinding ac motors are given in data sheet G6M.

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draft carburetor and develops 90 hp at 4600 rpm, while the supersports is fitted with three carburetors and gives off 105 hp at 4800 rpm, compression ratio being 7.5 to 1. The chassis are similar except for wheelbase and have box section side rails heavily braced, with torsion bar independent suspension at the rear, and trailing arms with enclosed coil springs at the front. Most of the bodies are built in the Alfa Romeo shops and are a combination of steel and light alloy.

There are two main truck chassis, the smaller with a four-cylinder Diesel of 4.53 in. by 5.51 in. bore and stroke, and the larger having a six-cylinder engine of the same dimensions. Four valves per cylinder, operated from a single camshaft are used on both engines. Cylinders and head are iron castings, with detachable liners for the cylinders, but apart from these there is a very extensive use of light alloy. The nitrided crankshaft is carried in seven bearings. Independent front wheel suspension is used on the smaller truck.

Alfa Romeo possesses the most elaborate and most completely equipped chemical and mechanical laboratories I have seen in Europe. Under the management of Professor Dupuis, it comprises three X-ray installations, operating at 300,000 volts, chemical laboratories for oils and fuels; paint testing and analyzing plant, spectroscopes, profilometers, electric furnaces for heat treatment, and a complete setup for vibration, traction, fatigue tests and electric welding tests. A school with 400 pupils in constant attendance, and receiving both theoretical and practical training, is a part of the factory.

This company is the only one in Europe to maintain a complete racing organization. While making use of all the factory facilities, this department is entirely independent, so as not to interfere with production. During the past year the 91½ cu in. cars, with two superchargers, have won practically every big race in Europe. Alfa Romeo has Engineer Pasquale Gallo as its president; the general manager is Dr. Ernieo Magnaghi, and the technical manager Engineer Giuseppe Ferrero.

Isotta Fraschini is linked up with the Caproni group and intends to produce this year the 183 cu in. rear-mounted V-eight model designed by Engineer Rapi. Caproni, on the other hand, will come out with a lower-priced flat-four front wheel drive job. In the meantime, Isotta Fraschini's activities covers truck and coach chassis with four- and six-cylinder Diesel engines. Other lines are marine engines, gear cutters, grinders and milling machines, as well as a range of textile machines.

#### Bianchi Factory Completely Rebuilt

Most severely damaged of all Italian factories was Bianchi, in the center of Milan. At the end of 1941 the works were a mass of rubble. Four years later it had been entirely rebuilt on (Turn to page 90, please)

# PAGE

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Five leading car factories answer the constantly increasing demand by installing Trico Washers at the factory. And fourteen makes of cars have built-in provision for quick installation by car dealers or service shops.



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the same site, without any assistance from the government. Output is now concentrated on trucks, motorcycles and bicycles, passenger cars having been dropped. O. M., at Brescia, received least attention from the air. This firm has dropped passenger cars to concentrate on Diesel trucks and coaches, the engines being built under license from the Swiss Saurer Company.

Generally, the smaller Italian firms are concentrating on sports and racing cars. These comprise Ferrari and Maserati as outstanding examples.

Cisitalia has come on the market since the war and has a most ambitious

program. The present output is based on Fiat units and embodies a four-cylinder valve-in-head engine of 67 cu in., treated as a sports, super sports and racing model. The frame is entirely special, being built up of chromemolybdenum steel tubes. Cisitalia has secured the services of Dr. Porsche, the German engineer who was responsible for the earlier Auto Union racing cars and who was commissioned by Hitler to design the Volkswagen. He is assisted by Von Eberhorst, who was chief engineer at the Zwickau factory of Auto Union. The program provides for the construction of racing cars with a

51½ cu in. flat twelve engine—two horizontal banks of sixes—with either a two or three-stage supercharger. An output of 400 hp is spoken of. A five-speed constant mesh transmission will be used. Engine mounting will be as near midships as possible, with the driver ahead of it.

## Italian Automobile Output Up 37 Per Cent

ACCORDING to the official figures just released, the output of motor vehicles in Italy for 1948 was 37 per cent higher than for 1947. A breakdown of production for the two years is given in the following tabulation:

	1947	1948	1948 Per Cent Change from 1947
Pass. cars....	25,375	44,221	+74.3
Lighter .....	6,678	9,591	+43.6
Med. trucks..	4,620	2,117	-47.3
Heavy trucks.	5,365	2,066	-61.5
Med. buses...	1,444	929	-35.7
Heavy buses.	854	841	-1.5
	43,736	59,765	+36.7

During 1948 Italy has exported 14,136 motor vehicles against 10,605 during 1947, an increase of 33.3 per cent, due principally to the orders of trucks and buses which Isotta Fraschini of Milan received from Pakistan and from Argentina, and also to several contracts secured from overseas markets by the Fiat Co. of Turin. Motor vehicle exports in 1946 amounted to 2863 units, the first after the end of the war.

Isotta Fraschini recently concluded a contract with the Brazilian government for construction of cars and trucks as well as Diesel engines in Brazil, and is reported to be negotiating a similar agreement with Venezuelan interests.

On the other hand, the support which the Italian Ministry of Transports continues to grant to the railways in Italy has led to a dangerous situation in road transports, one result being the decline in output of trucks and buses. This emphasis on railway transport might lead to serious difficulties in Italian transportation, especially during the Holy Year (1950) when the passenger traffic will increase. While reconstruction has enabled the Italian railway system to reach 70 per cent of its pre-war capacity, only from 40 to 50 per cent of the railway rolling stock has been rebuilt. This explains why on several Italian railways passengers must still travel on freight cars. The policy against road transports affects, therefore, the general interests of the country without leading to any benefit to the State Railway Administration, the accounts of which have shown during 1948 a total loss of 65 billion lire in spite of the increases of the railway tariffs.

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$\frac{1}{4}$ " to 4" O.D. 9 to 22 gauge  
SQUARE-RECTANGULAR  
 $\frac{1}{2}$ " to 2" 20 gauge 1" to 2 $\frac{3}{4}$ " 14, 16, 18 gauge

## Standard Sizes

Tube Diameter O.D. Size	Maximum Wall BWG		Minimum Wall BWG	
	Decimal	Gauge	Decimal	Gauge
$\frac{1}{4}$	.049	18	.028	22
$\frac{1}{4}$	.065	16	.022	24
$\frac{1}{2}$	.083	14	.022	24
$\frac{1}{2}$	.095	13	.022	24
$\frac{3}{4}$	.095	13	.022	24
$\frac{3}{4}$	.095	13	.028	22
1	.095	13	.028	22
1	.095	13	.028	20
1 $\frac{1}{4}$	.095	13	.035	20
1 $\frac{1}{4}$	.095	13	.035	20
1 $\frac{1}{2}$	.120	11	.035	20
1 $\frac{1}{2}$	.120	11	.035	20
1 $\frac{3}{4}$	.120	9	.035	20
1 $\frac{3}{4}$	.120	9	.035	20
2	.148	9	.035	20
2	.148	11	.035	20
2 $\frac{1}{4}$	.120	9	.035	18
2 $\frac{1}{4}$	.148	11	.049	18
2 $\frac{1}{2}$	.120	9	.049	18
2 $\frac{1}{2}$	.148	9	.049	18
2 $\frac{3}{4}$	.148	9	.049	18
2 $\frac{3}{4}$	.148	9	.049	18
3	.148	9	.065	16
3 $\frac{1}{4}$	.148	9	.065	16
3 $\frac{1}{4}$	.148	9	.065	16
3 $\frac{1}{2}$	.148	9	.065	16
3 $\frac{1}{2}$	.148	9	.065	16
3 $\frac{3}{4}$	.148	9	.065	16
3 $\frac{3}{4}$	.148	9	.065	16
4	.148	9	.065	16

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FLANGED, EXPANDED, TAPERED, DEPRESSED BEADED, EXPAND  
BEADED, ROLLED, EXTERNAL UPSET, INTERNAL UPSET,  
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## Publications Available

(Continued from page 60)

ment such as tilting rotary tables, plain rotary tables, power traverse units, etc. Also in the catalog are typical operations which may be performed on P&W jig borers.

### A-52—Contour Milling Machine

Sunstrand Machine Tool Co.—A six-page illustrated folder contains information on the Sunstrand cam-controlled contour milling machine. The milling

of external and internal contours, and the making of master cams by reversing the operating procedure are among the subjects covered. Also included are illustrations of typical work pieces produced by the machine.

### A-53—Solder and Soldering Methods

The Kester Solder Co.—A new 28-page technical manual entitled *Solder*

and *Soldering Techniques*. The manual affords a complete analysis of the properties and application of soft solder alloys and soldering fluxes. It lists the flux-core wire solder, solder preforms, solid wire and bar solder, and external soldering fluxes made by Kester, and describes the Company's technical and industrial service.

### A-54—Tenite Specifications

Tennessee Eastman Corp.—A new and revised edition of the technical book, *Tenite Specifications*. The present edition (the fifth) contains tables of physical properties of Tenite, Eastman cellulose ester plastics, in the various formulas and flows. A new feature of this section is the emphasis on improved weather-resistance of Tenite II, Eastman cellulose acetate butyrate plastic. The results of tests conducted on Tenite I (Eastman cellulose acetate plastic) and Tenite II are set forth in a series of charts and graphs. Tensile- and flexural-strength values have been adjusted to conform with the latest ASTM testing methods.

### A-55—Industrial Bearings

Johnson Bronze Co.—Johnson's 1949 catalogue on industrial bearings. This year several new sizes of general purpose bearings, electric motor bearings and universal bronze bars have been added. Another new feature this year is the section devoted to self-aligning bearings. All of these, a product of powder metallurgy, are now stock items.

### A-56—Jig Borer Cutting Tools

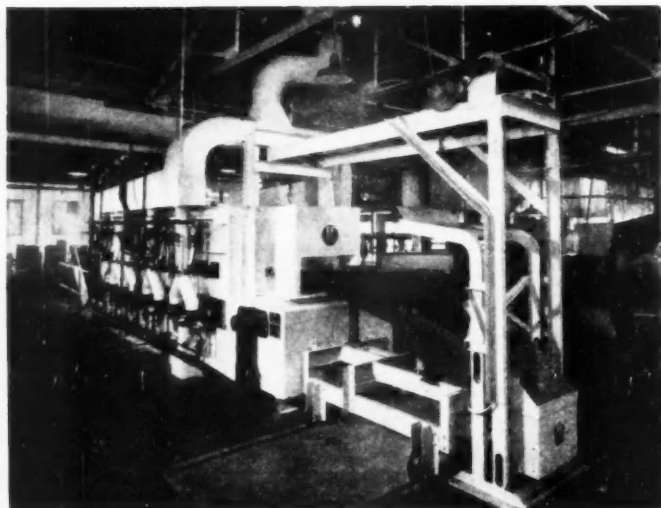
Moore Special Tool Co., Inc.—A booklet entitled *Jig Borer Cutting Tools* contains tables for boring holes from 1/16 in. to five in. diameter in materials 1/4 in. to four in. thick within tolerances to 0.0002 in. In it are given proper cutting tools, feed, speed and estimated time for each boring operation, as well as constants for converting spindle speeds for different materials. The booklet also contains illustrations and descriptions of all Moore jig borer accessories.

### A-57—Washing Machine

The B. F. Goodrich Co.—A six-page folder describes in detail the construction, operation and advantages of a pickling and washing machine which prepares formed-metal products for enameling, painting or plating. Among features of the folders are a cut-away illustration of the machine, with descriptions of the most important parts and the roles they play. A table listing the solutions used in each of the ten sections, automatic cycle time, and immersion cycle time is included.

### A-58—Specifications for Aluminum Alloys

Federated Metals, Div. of American  
(Turn to page 96, please)



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NEVER BEFORE could you be so *certain* of piston ring performance as with today's Pedrick piston rings.

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Through a new, exceptionally precise method of quality control, *every* Pedrick ring now comes to you as fully tested and as perfect as if it had been made individually by the chemists, engineers, physicists and metallurgists themselves.

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control follows through at *every* stage of machining. With this new system, we are actually able to *see trends* in the performance of machine tools. Thus, we can detect and correct deviations before they would ever be revealed by ordinary inspection procedures. **Results:** piston rings of *uniform* high quality . . . and piston ring performance of *uniform* excellence!

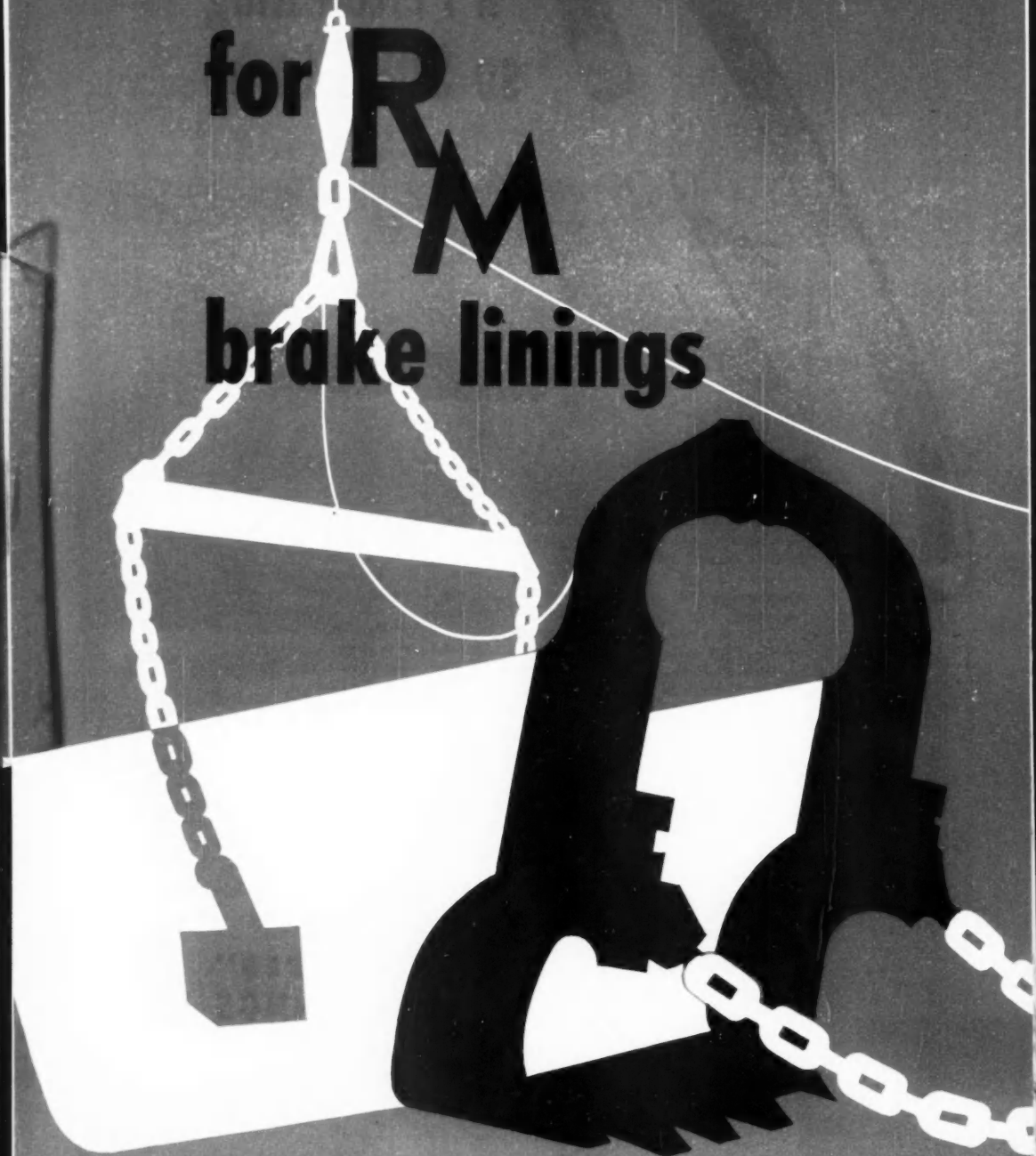
This development is important to every user of piston rings. Like "Heat-Shaping," it brings extra advantages . . . freedom from operating troubles . . . greater economies in oil and fuel . . . longer effective life. WILKENING MANUFACTURING CO., Philadelphia 42, Penna. In Canada: Wilkening Manufacturing Company (Canada) Ltd., Toronto. In Detroit, Michigan: 3075 Penobscot Building, Woodward 3-4110.

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RAYBESTOS-MANHATTAN, INC., Manufacturers of Brake Linings • Brake Blocks • Clutch Facings • Fan Belts • Radiator Hose • Mechanical Rubber Products • Rubber Covered Equipment • Packings • Asbestos Textiles • Powdered Metal Products • Abrasive and Diamond Wheels • Bowling Balls



**FIRST IN FRICTION**

## Would you like to have the opportunity to slash your spring costs?



THE KEY to lower spring costs is in design and manufacture. Perhaps in your own case, a small modification in design which would not affect your product's performance would make it possible to substantially reduce the cost. Or maybe your springs are being made in several operations when one would suffice. Skilled springmakers here at Accurate have the experience—the "know-how"—to recognize such conditions and to correct them! Our manufacturing facilities are modern and complete—we have the equipment to do the job right, at the lowest cost to you.

We would welcome the opportunity to show you what we have done for others and point out what we can do for you. Write, wire or phone, today; your inquiry will receive prompt attention.



A dependable source of supply

**ACCURATE SPRING MFG. CO.**  
3810 W. Lake St. • Chicago 24, Ill.

*Springs, Wire Forms, Stampings*

Smelting and Refining Co.—A compilation of important aluminum industry specifications called *Aluminum Alloys, U. S. Standard Specifications*, lists the latest specifications of ASTM, AMS, SAE, Federal, Army, Navy and others, as they pertain to aluminum sand castings, permanent mold castings, die castings, wrought alloys and ingots. The current edition supersedes an earlier wartime version.

### A-59—Support Clamps and Blocks

Thomas Associates—A 24-page catalog covers the complete Thomas line of 3000 sizes and combinations of standard bare metal and cushioned support clamps and line support block assemblies for aircraft and industrial use. It gives completely detailed prints with material finishes, specifications and range of sizes offered in aluminum alloy, steel and stainless steel. New items added in this issue include electrical busbars, plate nut shims, wedge lock clamps and a new line of  $\frac{3}{8}$  in. lightweight clips. The catalog includes installation sketches showing suggested applications and special features.

### Further Decline in Strikes

(Continued from page 25)

But the Bureau clinches the matter by figuring further and finding that last year's 20 big strikes accounted for 19 million man-days lost (56 per cent of total) as compared with 17.7 million lost man-days in 1947's big strikes (about 50 per cent of total).

Largest of the 1948 stoppages, of course, was the 40-day shutdown of the bituminous mines, over the handling of pensions, which involved 400,000 soft coal miners before it ended. A shorter strike of eight days took out 30,000 workers in the anthracite mines.

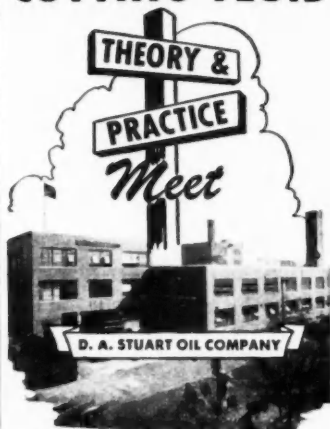
In the automobile field, 75,000 Chrysler workers were out for about 17 days in May and 13,000 more were off for four days in November. Hudson had 26,000 man-days of lost time when workers stayed off the job for two days last March.

Other major strikes included a 142-day strike by 18,000 Boeing workers at the Seattle plane plant, the 93-day longshoremen's strike on the West Coast, and a combined loss of more than 1,000,000 man-days by employees of farm machinery manufacturers.

Wages and "fringe" benefits were the major issues in last year's strikes, the BLS says. Union representation rights, the union shop, and hiring halls also figured in the stoppages.

Last year saw strikes fall back more nearly to a normal pattern, the BLS conclude. By this, it means that strikes increased in number each month from January until July and then steadily decreased to another low point in December.

## Where CUTTING FLUID



**SELDOM** does the most carefully developed scientific theory provide the final answer in the shop; neither is practical experience entirely dependable. It usually takes a combination of both in order to select and apply the cutting fluid that will give the best results on a given machining job.

D. A. Stuart Oil Company offers you a combination of theory and practical experience that pays dividends in better machining and fewer production headaches. The theory emanates from research in the modern D. A. Stuart laboratories; practical approach comes from men who have years of experience in shop problems and techniques. That is why Stuart products so often smooth out jobs on which other cutting fluids fail. Ask your D. A. Stuart Oil Co. representative to tackle your tough jobs.

### ON-THE-JOB REPORTS PROVE RESULTS

"... D. A. Stuart's SOLVOL Water Mixed Cutting Compound was put in on a trial basis for milling high carbon alloy steel. High speed alloy cutters were used and it was found that SOLVOL increased the cutter life 3 to 4 times over what they had been getting. ... Write, if you would like to have a booklet on SOLVOL."

STUART oil engineering goes with every barrel

**D. A. Stuart Oil Co.**

2733 S. TROY ST. • CHICAGO 23, ILLINOIS

## Here's Why **CLEARING PRESSES** Cost Less to Operate

If you count labor and machine time losses for die repairs as part of *press costs*—and usually that's where they belong—you'll find Clearing presses are actually the cheapest machines you can buy.

Performance records in many a plant have demonstrated that extreme precision and rigidity, so carefully designed and built into Clearing presses, pay handsome dividends. A slight tilt of a die under load, for example, can cause abnormal wear which quickly reaches the point where down time and spoiled material start cost figures skyrocketing.

Clearing has always been known as a quality builder. With labor and material costs rising as they are today, Clearing quality becomes vitally important because you can't achieve maximum production economy without it.

**CLEARING MACHINE CORPORATION**  
6499 West 65th Street Chicago 38, Illinois

Photo shows Clearing presses at work in the Rouge Plant of the Ford Motor Company.

# CLEARING PRESSES

THE WAY TO EFFICIENT MASS PRODUCTION





**CHECK THESE  
EXAMPLES OF  
AUTOMOTIVE  
APPLICATIONS  
FOR  
GAST UNITS**



**AIR  
MOTORS**  
Used on...  
Crankcase Flusher  
(Air Motor & Gear Pump)

\*\*\*  
Stroboscopic  
Distributor Test Set  
(Reversible Air Motor)

\*\*\*  
Explosion-Proof  
Drive of Fuel  
Pump on Factory  
Production Line  
Carburetor Tests



**VACUUM  
PUMPS**  
Used on...  
Gasoline Hustler  
Test Stand

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Demonstrator for  
Simulating Auto  
Manifold Vacuum

**HAVE YOU A NEW  
APPLICATION?**

## VACUUM SPEEDS CHUCKING

... another problem solved with

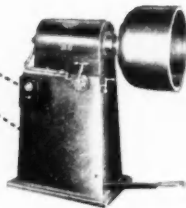
### GAST ROTARY PUMPS

HOW TO HOLD ODD-SHAPED PIECES  
IN SPEED LATHE

**Problem:** Cut chucking time and boost production on speed lathe used for polishing.

**Solution:** A Gast Rotary Vacuum Pump supplies quick, positive vacuum needed for chucking. Rating, 17 c.f.m.; Vacuum to 27"

**RESULT:** Faster chucking on this Gast-equipped machine.



**WRITE TODAY!  
Request your copy of Gast  
IDEA-CATALOG**

This is but one example. Over 200 variations of basic Gast units now serve as original components on scores of products. In totally unrelated fields, Gast Air Motors, Vacuum Pumps and Compressors are proving their unique advantages. Perhaps you can use them to help on a new application. Write now for details.



**AIR MOTORS • COMPRESSORS • VACUUM PUMPS**  
TO ONE N.Y. TO 10 LBS. TO 28 INCHES  
GAST MANUFACTURING CORP., 129 Hickley St., Boston Harbor, Mich.

## AIRBRIEFS

(Continued from page 41)

carry them forward another 10 years with performance comparable to more modern twin-engine types. Douglas has offered to fit new, high-lift outer wing panels, new tail surfaces, increase capacity to 26 passengers, strengthen the inner wing and nacelle structure and install new Wright Cyclone engines of 1475 hp each. These modifications would increase cruising speed to better than 250 mph and cut operating costs 20 per cent. Douglas will do the work for \$150,000 to \$200,000 per airplane yet the original DC-3's cost only \$115,000 to buy brand-new!

### Striking the Bell

Like the cymbal player who has only a single note to strike in the entire symphony, Goodyear's lighter-than-air department has a project—its first since 1944—designing and building the new "N" class semi-rigid craft for the Navy. Goodyear retains a substantial lighter-than-air department year-round whether there is work or not. Dr. Karl Arnstein, Goodyear Aircraft chief engineer, once told this reporter that Goodyear also maintained a bridge-building department that had done no business in 15 years. "But," explained the genial Arnstein, "if anybody ever wants a cantilever bridge built we will be ready for the job!" The new blimp will be the largest ever built with a capacity of 825,000 cu ft of helium. It will be 324 ft long, 71 ft wide and 92 ft high. Navy will use the giant in sea-search and off-shore patrol duties.

### Man-Carrying Rocket

Air Force Capt. Charles Yeager's fame is now secure for immortality but we think his most recent performance merits for more medals for bravery than any of his supersonic flights. If you can imagine sitting on the ground in the X-1 with 300 gallons of alcohol and 313 gallons of liquid oxygen behind you, touching a button that ignites this mixture and starting off down a runway, then you can appreciate the sheer courage of Yeager in making a ground takeoff of the X-1 recently. The 6½-ton craft shot off the runway in 2300 ft and climbed to 23,000 ft before the fuel was exhausted. The first 13,000 ft were cleared in just one minute! Although we have grown used to the idea of the rocket-powered X-1 being some sort of "superplane," it is interesting to note just how quickly the standard turbojet fighter is approaching its performance. The British Gloster Meteor recently climbed 7½ miles in 7½ minutes, which, as any engineer knows, is considerably faster than a mile-a-minute in the early stages. Actually, the twin-Beryl-powered fighter covered the first 10,500 ft in one minute, which is astonishingly close to the "super" performance of the rocket X-1!

## FOR SALE GENERAL ELECTRIC DYNAMOMETER

General Electric Type TLC-50 DC Current Electric Dynamometer used for engine testing and motoring. Motor generator high torque type. Speed: 775-2500 RPM. Rated to absorb 65 Horsepower. Will handle 100 Horsepower on intermittent load. Includes beam scale, cooling grids, control panel, rheostat and other accessories. Has had excellent care and is in fine condition. Has original commutator finish. Reason for selling: Larger capacity unit installed. Complete list of equipment and price on application.

**ENSIGN CARBURETOR COMPANY**  
BOX 229 HUNTINGTON PARK, CALIF.

**AUTOMOTIVE  
INDUSTRIES  
Goes into  
Leading  
Plants in the  
Automotive  
and Aircraft  
Industries**



# Reynolds weaves

## AND DRAWS ITS OWN WIRE



**Reynolds**  
*Industrial*  
**WIRE  
CLOTH**

You can get wire cloth made exactly to your specifications—from Reynolds. That means more than woven to order. Because Reynolds, early in its 54 years of wire cloth making, began drawing its own wire—to control quality. That means the wire itself, as drawn by Reynolds, will be as you specify—*exactly right* as to metal, alloy, temper, flexibility, gauge and finish. And, of course, Reynolds weaves it to your specification—uniformly right as to weave and mesh. That makes it *your* wire cloth—made to meet all the needs of *your* product. You can depend on Reynolds engineers to carry out your specifications to the letter. Consult them. No cost or obligation.




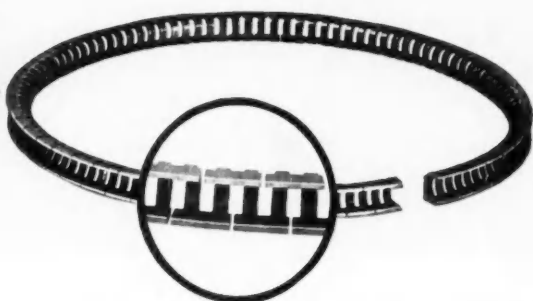
Send for  
**NEW  
Catalog**

### REYNOLDS WIRE CO., DIXON, ILLINOIS

# THIS U-FLEX RING HAS GONE 120,000 MILES in TRUCK SERVICE



This is how the Thompson U-FLEX Oil Control Ring looked when it went into the heavy-duty truck engine.

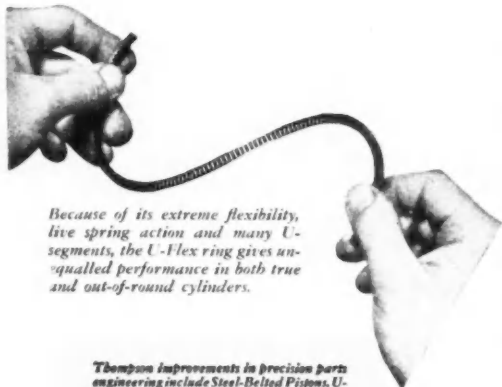
**C**RITICAL INSPECTION OF THE U-FLEX OIL CONTROL RING AFTER 120,000 MILES shows it to be in remarkably good condition, still ready for considerable further service.

Note that the gaps between the many U-segments are still open after 120,000 miles, permitting free drainage of excess oil back into the crankcase. The flexing action between the U-segments of the working ring discourages formation of carbon.

Note also that after all this hard service the rail edges are still bright, indicating all-around fit and pressure against the cylinder wall.

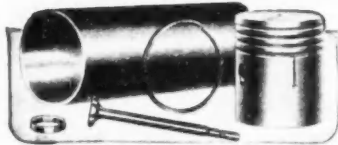
The Thompson U-Flex Oil Ring is being adopted by leading builders of trucks and passenger cars.

We invite other manufacturers to learn what this radically new type of oil control ring may do for them in longer engine life and reduced oil consumption.



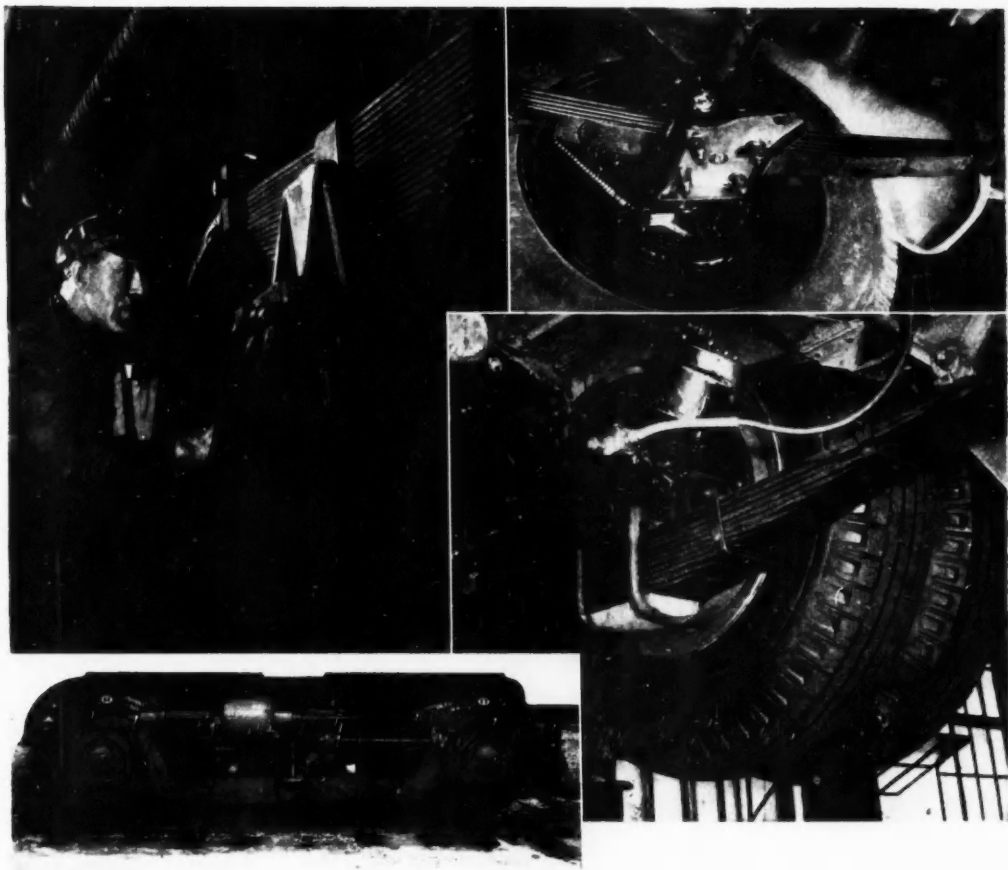
Because of its extreme flexibility, live spring action and many U-segments, the U-Flex ring gives unequalled performance in both true and out-of-round cylinders.

*Thompson improvements in precision parts engineering include Steel-Bellied Pistons, U-Flex Oil Control Rings, Cylinder Sleeves, Valve Seat Inserts, Sodium-Cooled Valves.*



## Thompson Products

CLEVELAND • DETROIT • LOS ANGELES • ST. CATHARINES, CANADA



## In SPRING STEELS size is an economical guide to analysis

Generally speaking, steels of medium or low alloy content are adequate for manufacturing springs of thin sections . . . conversely, steels of richer alloy content are usually essential for heavier springs. For example, it may be economical to make smaller springs from AISI grades 9255, 5150, or 4063; medium-weight springs from 6150, 8650, or 9260; and heavy-duty springs from 9262 or 8655.

The proper application of this principle requires a thorough study of the spring sizes and stresses to be encountered. It also calls for careful consideration of analyses and heat-treatments. Our metallurgists are familiar with all types of spring requirements

and will gladly help you find an economical solution.

When you are in the market for high-quality alloy steels remember that Bethlehem manufactures all AISI grades as well as special steels.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

*On the Pacific Coast Bethlehem products are sold by  
Bethlehem Pacific Coast Steel Corporation  
Export Distributor: Bethlehem Steel Export Corporation*



# BETHLEHEM ALLOY STEELS

# HOW 2600 PIECES PER HOUR ARE COMPLETED

on a

## DANLY 100-Ton PRESS



1/4" Thick Bar  
Pierced and Shaved  
in one operation.

### Equipped with Magazine Feed

Here's how a Danly Straight-Side Press equipped with an automatic magazine feed and spring-loaded ejector cuts stamping costs by eliminating slow, hand-feeding operations. With unusual speed and precision, two holes are punched and shaved simultaneously in 1/4" AISI 1335 stock. A two-step punch eliminates secondary operations. The pieces, which have been blanked and formed in a preceding operation are fed, positioned, and ejected automatically by means of a link and slide mechanism operated by an eccentric on the end of the main shaft. Operated continuously at a speed of 45 strokes per minute, a part is completed and ejected with each stroke of the press. A net production rate of 2,600 pieces per hour is attained.

### Precision Tolerances Maintained

Because of the extra rigid Danly press construction including a solid-type bed, deflections are reduced to a minimum and precision tolerances maintained. Likewise, the accurate-operating Danly press slide and a 2-post Danly Precision Die Set help maintain an unusually close tolerance on the hole centers. The result is higher production and better quality at less cost.

### Other Important Danly Features

Other Danly press features which contribute to high production efficiency and lower stamping costs include:

- Built-In Automatic Oiling System—puts right amount of clean, filtered oil where needed, including flywheel bearings.
- New Floating Friction Block Clutch—air cooled and air operated—performance tests show 8 million consecutive engagements with negligible wear.
- Pitman Wrist-Pin Design—assures closer operating tolerances—longer die life.
- Extra Sturdy Welded Steel Frame—All weldments stress-relieved before machining—assures permanent alignment—permits adapting standard or special stock handling equipment to suit needs.
- Wide Range of Standard Press Sizes—High production sizes from 50 to 800 tons. Straight-Side units up to 3,000 tons.

Write today for more facts on

DANLY PRESSES

# DANLY

**DANLY MACHINE SPECIALTIES, INC.**  
2100 SOUTH 52ND AVENUE, CHICAGO 50, ILLINOIS

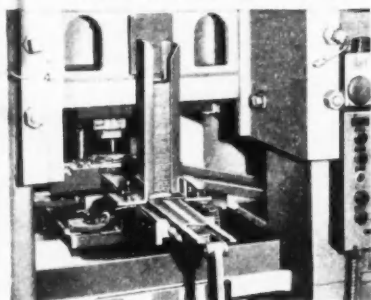


25 YEARS OF DEPENDABLE SERVICE  
TO THE STAMPING INDUSTRY

PRECISION DIE SETS...STANDARD AND SPECIAL • MECHANICAL PRESSES AND PRESS EQUIPMENT



Danly 1-Point 100-Ton Eccentric Geared Press at Chain Belt Co., Milwaukee, handling punching operations automatically.



Close-up showing magazine feed

### JOB FACTS

**Part Name:** Offset side bar for transmission chain.

**Material:** AISI 1335.

**Dimensions:** Length 3.706", Width 1 1/8" to 1 7/8", Thickness 1/4".

**Jobs:** Punch two holes of approximately 9/16" and 7/8". Hold precision tolerances on hole sizes and centers.

**Rate of Operation:** 45 strokes per minute. Net production 2,600 pieces per hour.





# for the First Time... A RIDING TYPE STACKER *It's the Transrider!*

Everyone knows the famous Automatic TRANSTACKER... the high lift stacker that moves, lifts and stacks material with "touch of your thumb" ease.

Now, for the first time, you get all the benefits of this miracle truck, but with the added advantage that you now can RIDE it. Operator sits comfortably on the TRANSRIDER... does your material handling with utter ease, lifting, tilting and driving simultaneously.

Its batteries are interchangeable with the Transporter Motorized Hand Truck Series, and no new charging equipment is necessary.

With a telescopic lift mechanism, the Transrider raises load to 130

inches, with an overall height of only 83 inches for clearance through standard boxcar and factory doors. Single lift, before telescopic uprights are extended, is 66 inches.

The shortest of any truck of like capacity, Transrider is maneuverable in cramped working quarters. Carrying a 36-inch load, it can right-angle stack in nine-foot aisles. This means added storage space within present building capacities. Truck capacities range from 2000 pounds for 48-inch long load to 3000 pounds for a 28-inch load.

At Transrider's new, low cost, every business now can use modern, money-saving material handling methods! Mail coupon for complete facts.

NOTHING LIKE IT FOR LOW  
COST MATERIAL HANDLING

## Tilting Type TRANSTACKER

This is the famous Transtacker you walk with... and now made even more efficient with new tilting uprights that cradle the load for easier, faster spotting of loads, and maximum protection for both operator and merchandise.

High pressure hydraulic single or telescopic lift stacks your product to new heights, to increase storage capacity. Finger-tip control lifts a 36-inch, 2500-pound load, or a 48-inch, 2000-pound load in a matter of seconds. Transtacker also operates on standard batteries, and chargers, interchangeable with the Automatic Transporter. Mail coupon.



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for  
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**Transrider  
Stacker**  
A PRODUCT OF AUTOMATIC

Lightens  
LIFE'S LOADS

### AUTOMATIC TRANSPORTATION COMPANY

DIV. OF THE YALU & TOWNE MFG. CO.

57 West 87th Street, Dept. B-9, Chicago 20, Ill.

Please send me catalog  
and complete facts on  
the new, low-priced

- ☐ TRANSRIDER  
☐ TILTING TYPE  
TRANSTACKER

Company Name.....

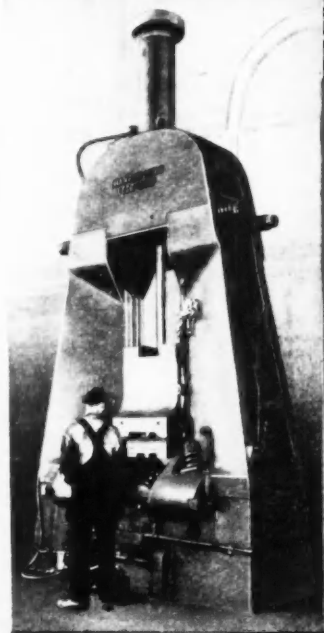
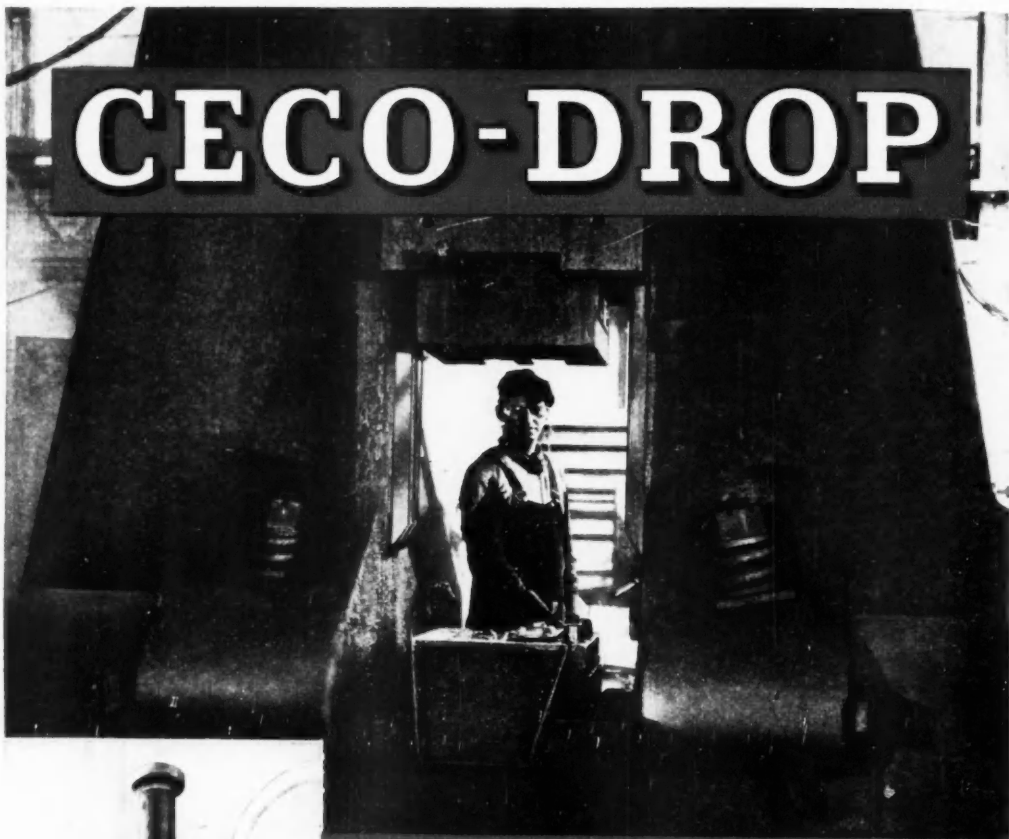
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Street Address.....

City.....Zone.....State.....

MANUFACTURERS OF THE FAMOUS TRANSPORTERS, TRANSTACKERS AND SKYLIFT ELECTRIC TRUCKS

# CECO-DROP



**The CECO-DROP**  
forges more minutes  
per hour,  
makes more forgings  
with fewer blows,  
is safer and easier to  
operate,  
costs less to operate.

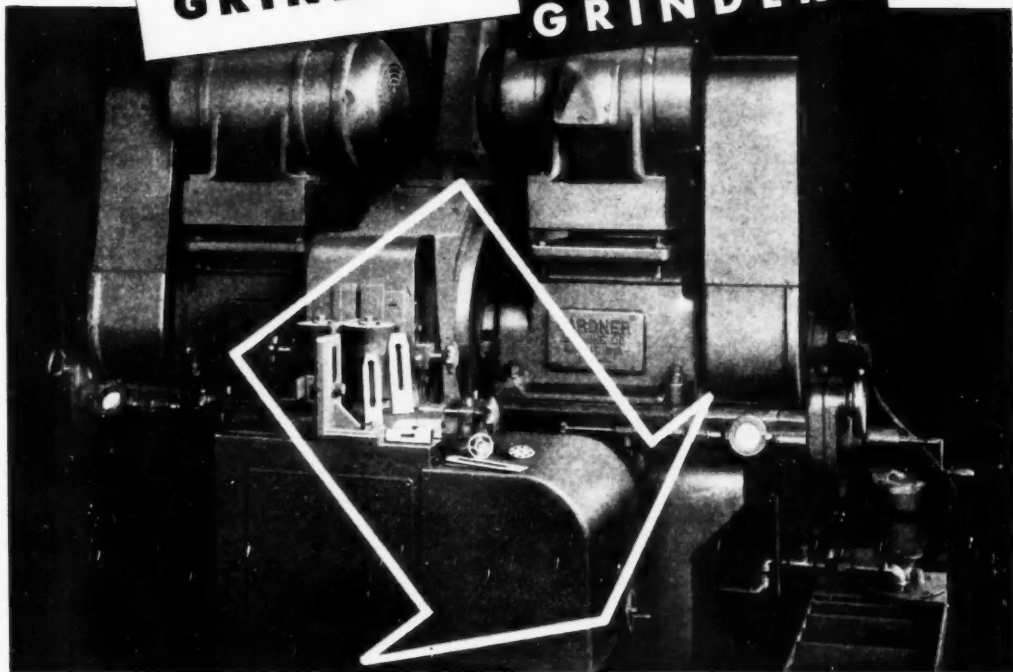
CHAMBERSBURG ENGINEERING CO.

**CHAMBERSBURG**  
Builder of **IMPACT** Machinery

CHAMBERSBURG, PENNA.

FOR

USE

**FASTER  
GRINDING**
**GARDNER  
Double  
GRINDERS**


**S**HOWN above, is one of many unusual parallel-surfacing jobs performed by the high-production "feed-thru" method — on GARDNER Double GRINDERS.



Use Modern  
GARDNER  
WIRE-LOKT  
Abrasives  
on YOUR  
Disc Grinders!

Here, plane blades are fed to rubber rolls that guide them between opposed grinding wheels, where TWO sides are parallel-surfaced at ONE pass thru the machine. Food chopper blades also are fed thru this machine, on the same fixture, at the rate of 20 per minute.

For faster, lower-cost parallel-surfacing, investigate the advantages of GARDNER Double GRINDING.

#### WORK DATA

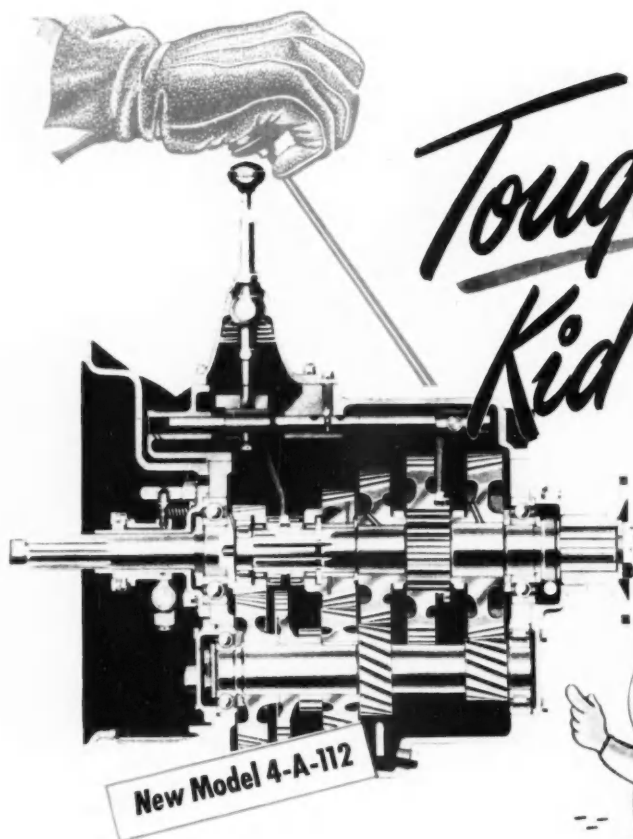
Part *Plane Blades*  
Material *Steel*  
Operation *Grind Two Parallel Sides*  
Tolerances *Clean Up to Uniform Thickness*  
Stock Removal *.012" to .015" Maximum Overall*  
Production *4 to 6 Pieces Per Minute*  
Feed *Hand Load to Rubber Feed Rolls*  
Machine *No. 125 - 26" Gardner Double Grinder*

GARDNER - GRIND  
YOUR *Flat* SURFACES

WRITE FOR OUR Double Grinder BULLETIN!

## GARDNER MACHINE COMPANY

444 East Gardner Street , , , , Beloit, Wisconsin, U.S.A.



**New Four-Speed  
Version of  
Fuller's Proved  
Model 5-A-1120**



"Truck-killer" hauls that call for sustained low-gear operation are made to order for the new Model 4-A-112 Fuller Transmission—a four-speed version of Fuller's extra-large, heavy-duty "1120" series. Model 4-A-112 is the outgrowth of Fuller's success with its five-speed Model 5-A-1120.

Helical gears in all forward ratios give Model 4-A-112 capacity to operate in low for long periods of time. The high capacity of helical gears results from the large tooth areas which are always in contact.

Gears in Model 4-A-112 are engaged easily by sliding clutches . . . large bearings insure long, trouble-free operation.

Used with a three-speed Fuller Auxiliary, it gives you high capacity, long wear-life, easy shifts and quiet operation through as many as 12 forward and three reverse speeds.

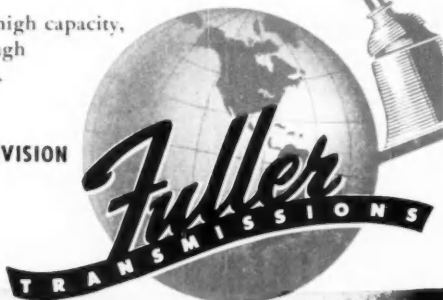
**FULLER MANUFACTURING COMPANY, TRANSMISSION DIVISION**

**KALAMAZOO 13F, MICHIGAN**

*Unit Drop Forge Division, Milwaukee 1, Wisconsin*

**WESTERN DISTRICT OFFICE (SALES & SERVICE)**

*1060 East 11th Street, Oakland 6, California*

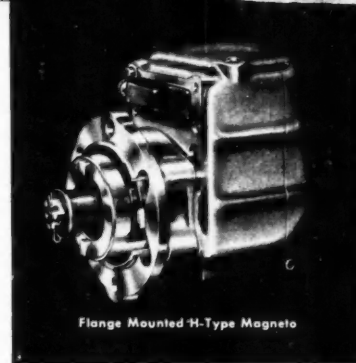


When Old Style  
Magnetos Give Up...

# BENDIX- SCINTILLA H-TYPE MAGNETOS...



Base Mounted H-Type Magneto



Flange Mounted H-Type Magneto

TRADE MARK

## Just Keep Sparking Along!

Dependability isn't something seasonal—it's a year around proposition and there are no short cuts in building it into engines. Specifying component parts you know will stand up under all operating conditions is the *only* answer! Ignitionwise, no magneto of its type will out-perform or out-last the Bendix-Scintilla® H Magneto. Our long experience in building ignition equipment for the vast majority of aircraft engines is reflected in this magneto for one-cylinder engines. Include the Bendix-Scintilla H-Type Magneto in your specifications. For further details, see your distributor or write the factory direct.

### OUTSTANDING FEATURES YOU'VE ASKED FOR

- Waterproof coil
- Waterproof, high-tension outlet
- Higher voltage at starting speeds
- Constant spark over entire speed range
- Equipped with impulse coupling
- Compact and sturdy construction

SCINTILLA MAGNETO DIVISION of



**BENDIX  
SCINTILLA**

SIDNEY, NEW YORK

Export Sales: Bendix International Division, 72 Fifth Avenue,  
New York 11, N. Y.



# DUREX-100 ENGINE BEARINGS FILL THE BILL

The development of higher speed engines necessitated engine bearings with superior properties of conformability, embedability, resistance to corrosion and fatigue cracking.

Moraine engineers called upon years of metallurgical know-how and experience to provide the answer. Through research, laboratory and field tests, they determined that such a bearing could be produced by bonding a special corrosion-resistant high lead base babbitt to an intermediate layer of steel-backed sintered copper and nickel.

The result was DUREX-100 ENGINE BEARINGS.

Today, the wide acceptance of Durex-100 bearings on Cadillac, Buick, Oldsmobile, GMC Trucks, and other automobiles and trucks demonstrates their satisfactory application to modern high speed engines.

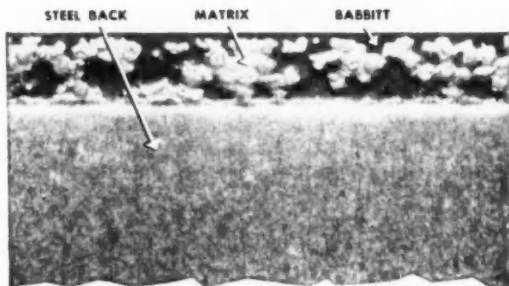


PHOTO-MICROGRAPH OF CROSS SECTION OF DUREX-100 BEARING. MAGNIFIED 31 TIMES

#### THE MATRIX MAKES THE DIFFERENCE

Steel-backed intermediate matrix of porous copper-nickel bonds mechanically, as well as metallurgically, with thin high lead babbitt overlay.

**MORaine PRODUCTS** DIVISION OF **GENERAL MOTORS**  
**DAYTON, OHIO**

**DUREX-100 ENGINE BEARINGS . . . BY MORaine**

## For Automotive Engineers

In this day of rising costs, every industry is seeking more efficient, more economical materials.

This is one of a series of messages showing how engineers in other industries are cutting costs or improving their manufacturing techniques with Revere Metals.

We hope that it may contain the germ of an idea that will be helpful to you.

IF YOU MACHINE COPPER—

## THIS REVERE METAL WILL SAVE YOU MONEY

**R**EVERE makes Free-Cutting Copper Rod, and if you are making electronic devices requiring machined copper parts of high conductivity, it will pay you to investigate the savings made possible by this metal. We would suggest that you make trial runs to prove what it will do under your own shop conditions. That was the procedure followed by The Trumbull Electric Mfg. Co., Plainville, Conn., with these results:

Part #18107 and 18108, contacts for the Type D switch illustrated, were designed around this alloy. Trumbull states: "On both these parts we found we could make them in one operation instead of two. That is, due to the smooth free cutting of the metal, it was unnecessary to perform a facing operation . . . Our Screw machine foreman advises that, in his opinion, both these parts could be made four times as fast as out of ordinary electrolytic copper rod."

#3731, 60 amp. post stud.—5,760 pieces run in 19.6 hours with no machine down-time; 10,425 pieces of ordinary copper rod run in 66.6 hours with 11.8 hours machine down-time. In addition to the extra time required, three sets of dies were used for the regular rod. "The savings of the free-cutting material over ordinary copper were figured at \$1.81 per thousand, including in these costs both material and direct labor."

#16552, space washer. "Savings per thousand over electrolytic copper were 77¢. This figure included the material differ-

ence and direct labor. In addition, there was an 18% saving in machine down-time."

#K-60-1A, 70-200 amp. stud. "The use of Free-Cutting Copper Rod on this part very definitely increased production and practically voided machine down-time."

In a letter to Revere, Trumbull added: "In general, at least for most of the parts we have used, we find that there is at least a 25% saving in machine time of free-cutting over regular copper. In addition, the workers are enthusiastic about this material, particularly when running studs, because of the fact that it is no longer necessary for them to keep a constant close watch on the machine to see that the turnings do not become tangled up with the moving parts of the machine."

The Trumbull experience is being duplicated in other machine shops. If you have not tried this Revere Metal, we suggest you get in touch with your nearest Revere Sales Office.

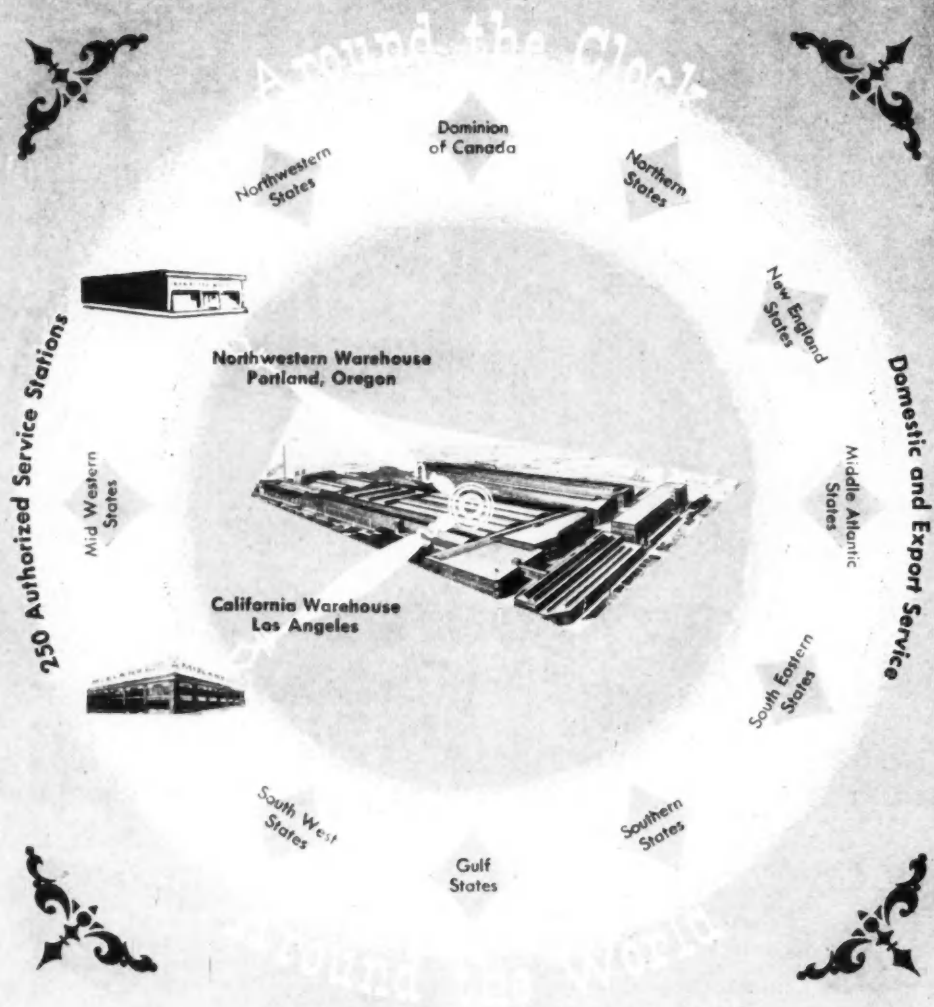
**REVERE**  
**COPPER AND BRASS INCORPORATED**

*Founded by Paul Revere in 1801*

230 Park Avenue, New York 17, New York

Mills: Baltimore, Md.; Chicago, Ill.; Detroit, Mich.; New Bedford, Mass.; Rome, N. Y. — Sales Offices in Principal Cities, Distributors Everywhere

# MIDLAND SERVICE



THE MIDLAND STEEL PRODUCTS CO. 6660 MT. ELLIOTT AVENUE • DETROIT 11, MICH.

# MIDLAND



POWER  
BRAKES



AUTOMOBILE  
AND TRUCK FRAMES



BUS DOOR  
CONTROLS



# NATIONAL OIL SEAL LOGBOOK

## PERIPHERAL SPEEDS AS HIGH AS 4000 F.P.M. PLACE HEAVY DEMANDS ON OIL SEAL PERFORMANCE

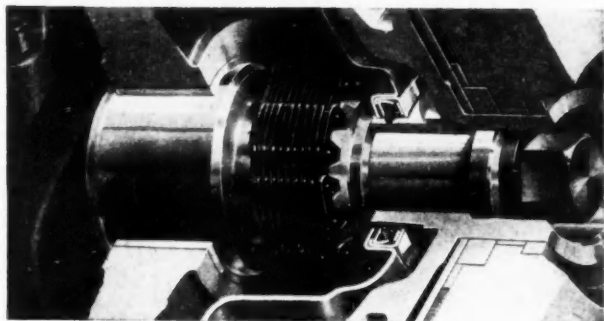


Figure 1

A measure of the over-all improvement in oil seal performance can be seen in the requirements for grueling operation encountered in the modern gasoline truck engines. A few years ago, peripheral speeds of 2000 to 2400 F.P.M. were considered the maximum. Today, however, standard type oil seals are performing more efficiently than ever before at speeds reaching as high as 4000 F.P.M.

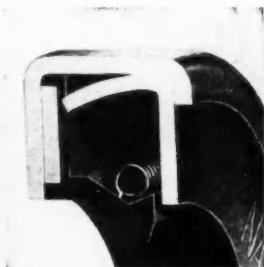
An example of this high performance is the gasoline truck engine, a section of which is shown in Fig. 1. In this particular application there are two standard type National Oil Seals. One on a shaft with diameter of 5 inches and one on a shaft with diameter of  $4\frac{5}{8}$  inches. The engine speeds are 2700 R.P.M. which means a peripheral of 3275 F.P.M. and 3550 F.P.M.

It must be borne in mind that there is a good deal of fluctuation in the

speeds of these gasoline engines. There is considerable vibration and some tendency to crankshaft whip. Temperatures run high particularly in hot climates. Because of lapped engine runs these temperatures will perhaps reach 275° on occasion.

Despite extreme exposure to dust and dirt, and the continuous operation of these gasoline truck engines, standard type National Oil Seals are performing efficiently for long periods. This is ample evidence that the introduction of new synthetic rubber compounds and development of new leather impregnation techniques have given engineers the materials with which to meet the challenge of higher speeds and temperatures.

Whether your sealing problem involves high speeds and temperatures or not you are invited to contact the nearest National Oil Seal Engineer. These men have helped industry



Typical National Oil Seal



Typical National Oil Seal

solve many and varied oil sealing problems during the past quarter century. This experience is yours without obligation.



**NATIONAL MOTOR  
BEARING CO., INC.**

General Offices: Redwood City, California  
Plants: Redwood City and Los Angeles,  
California; Van Wert, Ohio

### CALL IN A NATIONAL ENGINEER FOR RECOMMENDATIONS

**BUFFALO:** 50 Arlington Place, Grant 2280. **CHICAGO:** Room 2014 Field Building, Central 8663.  
**CLEVELAND:** 210 Heights Rockefeller Building, Yellowstone 2720. **DALLAS:** 3013 Highland Park Village, Justin 8-8453.  
**DETROIT:** Room 1026 Fisher Building, Trinity 1-6363. **HOUSTON:** 6731 Harrisburg Boulevard, Wayside 3-1246.  
**LOS ANGELES:** 2244 East 37th Street, Kimball 6384. **MILWAUKEE:** 1717 E. Kane Place, Lakeside 2838.  
**NEW YORK CITY:** 122 East 42nd Street, Lexington 2-8260. **PHILADELPHIA:** 401 North Broad Street, Bell Walnut 2-6997.  
**REDWOOD CITY, CALIF.:** Broadway and National, Emerson 6-3861. **WEST SPRINGFIELD, MASS.:** 1025 Elm Street, Springfield 2-1881.  
**WICHITA:** 340 North St. Francis Street, Wichita 2-6971.

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Fully counterbalanced crankshaft—the ultimate in modern forging technique . . . Wyman-Gordon . . . crankshaft forging specialists since the introduction of the internal combustion engine . . . first to forge crankshafts with integrally forged counterweights . . . . .

*Standard of the Industry for More Than Sixty Years*

**WYMAN - GORDON**

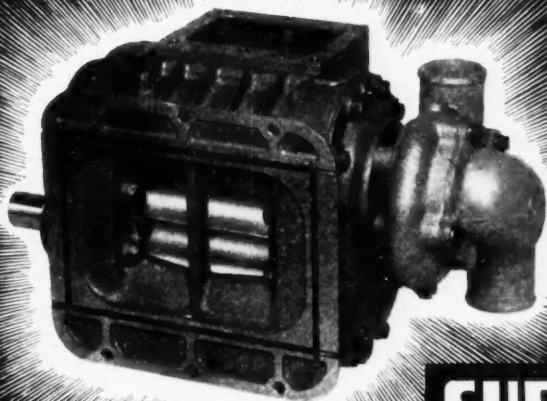
***Forgings of Aluminum, Magnesium, Steel***

**WORCESTER, MASSACHUSETTS, U. S. A.**

**HARVEY, ILLINOIS**

**DETROIT, MICHIGAN**





# SCHWITZER- CUMMINS SUPERCHARGERS

**POSITIVE DISPLACEMENT**  
...Sizes to Supercharge  
Engines 50 H.P. to 500  
H. P. Rating — Pressure  
Ratios 2 to 1 Maximum.

- OIL PUMPS
- WATER PUMPS
- COOLING FANS
- SUPERCHARGERS
- VIBRATION  
DAMPENERS
- AUTOMATIC  
SHAFT SEALS

**T**HIRTY YEARS of intensive work on the varied problems related to the development and manufacture of superchargers for all types of internal combustion engines has developed here at Schwitzer-Cummins Company a unique ability to select the best in type of equipment and the "know how" to apply it for the utmost in compactness, efficiency and reliability. Final unit production cost is our prime consideration at all times.

We shall appreciate the opportunity to study your supercharger requirements, either for a new engine design or to improve present performance. We can place at your disposal qualified technical experience and knowledge of proven and latest developments in this field. Our long service to the industry embraces the designing and building of superchargers and their drives for marine and stationary engines—for buses, trucks and locomotives—for earth movers, power generators, pumping, hoisting, and construction equipment and many specialized uses—gasoline and Diesel, two cycle and four cycle, large and small.

Illustrated here is an unusual combination of supercharger and water pump for a six cylinder, two cycle Diesel with automotive engine type bearings, pressure lubricated from engine oil pump.

Whatever your requirement or application, we feel we have something for it. May we serve you needs?

#### ALL IMPORTANT PARTS

are manufactured in our own plants under direction of our supercharger engineers for full interchangeability and the utmost simplicity on service requirements.

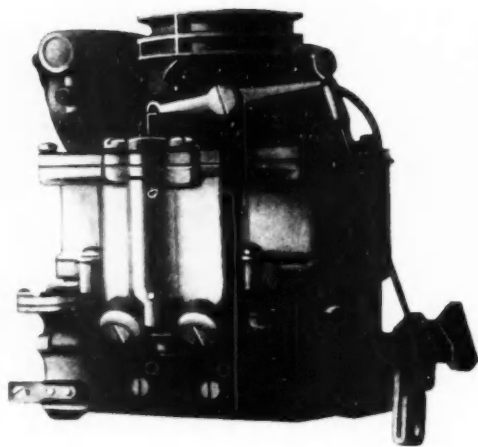
More power and improved performance from your engine with compactness, simplicity and low cost. Manufactured to our design or to suit requirements peculiar to your own.

**SCHWITZER-CUMMINS COMPANY**

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**CARBURETORS—  
AND CARBURETORS ONLY  
FOR NEARLY 40 YEARS**



You Can Depend on the Name

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REG. U. S. PAT. OFF.

for the finest carburetion

ECLIPSE-MACHINE DIVISION OF

• Standard Equipment Sales: Elmira, N. Y.

• Service Sales: South Bend, Ind.



# REEVES ARMY TWILL



**"CUT OUT"**

**for good looks and longer wear**

REEVES ARMY TWILL is built to "take it"! Over 100 million yards of this versatile, high-quality, combed cotton fabric have been delivered to the Armed Services—exceeding rigid Government specifications.

Whatever your industrial requirements may be, you'll find Reeves Army Twill outstanding. It resists rough usage. It stands up under extreme laundering conditions. And it keeps a neater appearance longer.



**"FROM COTTON TO CUTTER"**

Reeves Army Twill is Sanforized—residual shrinkage is less than 1%. It comes in a wide range of vat-dyed colors fast to sun, water and perspiration. It is one of many durable fabrics made by Reeves for industrial purposes. Write for the names of manufacturers specializing in your industry.

**REEVES BROTHERS, INC.** 54 WORTH STREET, NEW YORK 13, N. Y.

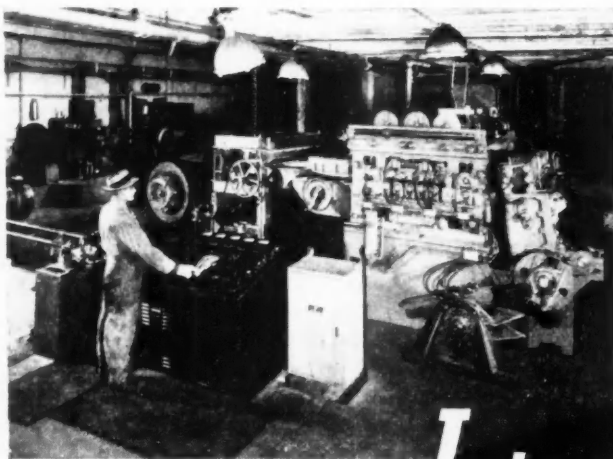
REPRESENTATIVES IN: Akron • Atlanta • Boston • Chicago • Dallas • Los Angeles • Philadelphia • Portland, Oregon • St. Louis • Montreal • Toronto

# HE IS DOUBLY SERVED WHO GETS HIS STEEL, and GETS IT... *when he wants it*

International has helped many manufacturers meet their supply problems by providing dependable service in de-coiling, flattening, cutting, and pickling, or by coil slitting.

Here you will find such equipment as is used by the mills . . . the most modern, independent setup of this kind in the Midwest.

International — like everyone — has none too much steel. But, if you have available tonnages of hot rolled coil, International can process it for you on a basis that will assure a dependable, steady supply . . . and, perhaps, save you money. Ask about our service.



International's Flying Shear de-coils, flattens, cuts accurately to length. Coil splitter may be seen in background.

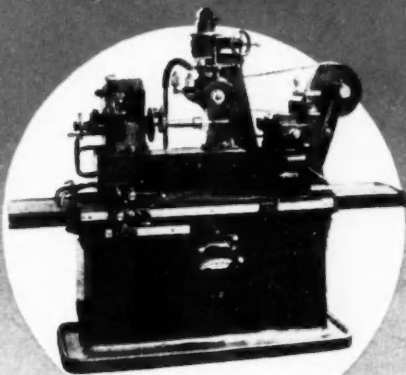


## *International*

ROLLING MILL PRODUCTS CORPORATION

5033 S. KEDZIE AVE., CHICAGO 32, ILL. Phone HE 4-5200

# *We were Proud of this GEARGRIND 30 Years Ago!*



At that time it represented ten years of progress in the art of Formed Wheel Grinding, whereby gears and splines were ground after hardening by means of an accurately formed grinding wheel. The contour of the grinding wheel was maintained by frequent dressing, using a special Geargrind wheel trimmer.



TYPE  
GG-10 x 48A

## **BUT PRESENT MODELS EARN** *More Money for You!*

### **FEATURES**

Automatic grinding wheel feed  
Automatic wheel feed for truing

Automatically cushioned trim position

Automatic lubrication of ways

Double column support for grinding wheel head

Axial grinding wheel spindle adjustment

High work table speeds

Control panel with interlocked safety features and highly accessible push button and other control

Index head spindle mounted on tapered roller bearings

About the only resemblance between today's GEARGRIND and its predecessors is the principle involved.

On the GG-10 x 48A shown above tooth spacing is controlled by a precision ground master index plate. The work reciprocates past the grinding wheel on a short stroke—just long enough to clear the wheel—and at each reversal point the grinding wheel feeds down. After grinding on one tooth space until a "rough size" is reached, the work is automatically indexed and the next tooth space is ground.

After a predetermined number of teeth have been ground the dresser automatically moves into position to true the grinding wheel. Once the roughing is complete the work is finish ground in the conventional manner, indexing automatically from tooth to tooth.

This method of grinding is 3 to 4 times faster than by any previous machine of comparable capacity, and the many automatic features permit one man to operate more than one machine.

*The* **GEAR GRINDING**  
MACHINE COMPANY  
DETROIT 11, MICH. U.S.A.

*Write for Information Today!*



## MEMO

*How to show  
your Treasurer*



**...that wearing out an old machine is expensive**

Of course, you know that an obsolete machine, even with its low carrying charges, usually costs more to run than a new one. Your treasurer probably knows that, too; but it won't hurt to remind him that the best time to replace old machines is before they are completely amortized on the books. For, an automatic five years old is dangerously below today's Acme-Gridley production standards.

If you have seen new Acme-Gridley Automatics in action, you know that doubled production is not uncommon. Maybe we could help you prove this point for your treasurer—by placing in your hands more case histories of the actual experiences of some of our customers—down-to-earth records of dollars saved with new Acme-Gridley Automatics. Here's a typical example:

CUT THIS OUT FOR USE WHEN YOUR TREASURER WANTS PROOF

### AN ACME-GRIDLEY CERTIFIED CASE STUDY

#### THIS IS WHAT HAPPENED

**MACHINE** 2" RB-6 Spindle Acme-Gridley Automatic  
**PART TURNED** Steel Eccentric Bushing

**MACHINING TIME**—17½ seconds for 15 operations

**FORMER METHOD** Blank out on automatic, then, on second machine, finish eccentric shoulders, internal recess and gauge O.D.

**PRODUCTION INCREASE** 300%

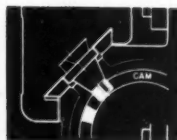
#### AND HERE'S ONE IMPORTANT REASON

THE ACME-GRIDLEY CROSS SLIDE is rigidly supported, low in the frame, without overhang, and has easily adjustable gibs on hardened steel ways. This design provides direct contact between the drum cam

and roll, and at the center of the slide. Positive cam control is insured and excessive linkage is avoided. Moreover, there are fewer parts to wear.

Generous open space around the slides gives more chip clearance, and more efficient operating convenience, through greater accessibility to tools all

factors that insure accuracy, increased production and lower costs.

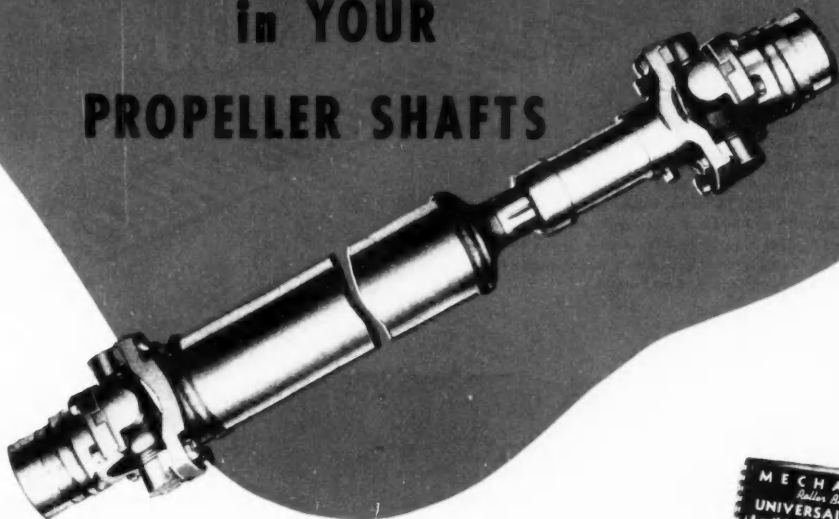


**ACME-GRIDLEY BAR and CHUCKING AUTOMATICS** built in 4, 6 and 8 spindle styles, maintain accuracy at the highest spindle speeds and fastest feeds modern cutting tools can withstand.

### THE NATIONAL ACME COMPANY

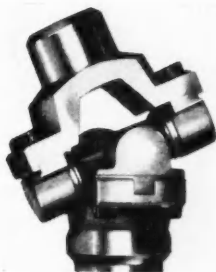
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# REDUCE WHIP and RUNOUT in YOUR PROPELLER SHAFTS



MECHANICS Roller Bearing UNIVERSAL JOINT brake flange and fitting yokes are accurately machined all over and **BALANCED**, to reduce whip and runout to a minimum. The scientific design and accurate machining are distinct advantages over clumsy flanges that have large, unmachined surfaces. MECHANICS shafts are straightened, balanced and factory tested at top operating speed, to insure smooth operation. The original alignment and balance are not disturbed by replacing MECHANICS cross-and-bearing assemblies, because the bearings and pilots are accurately ground to insure absolute centering and perfect fit.

**MECHANICS UNIVERSAL JOINT DIVISION**  
Borg-Warner • 2024 Harrison Avenue, Rockford, Illinois



Our new catalog—showing the complete line of MECHANICS Roller Bearing UNIVERSAL JOINTS will be sent to manufacturers upon request.

# MECHANICS

*Roller Bearing* ■

# UNIVERSAL JOINTS

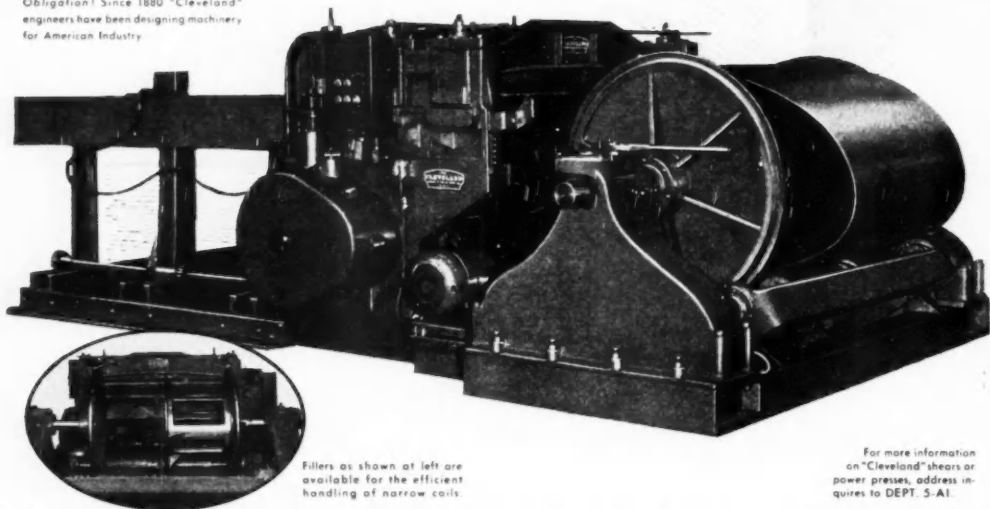
**For Cars • Trucks • Busses • and Industrial Equipment**

# CLEVELAND SHEARS OFFER UP TO 60 CUTS PER MINUTE!

*From COILS.. to SHEETS.. to STACKS!*

This "Cleveland" engineered shear is made in various capacities to meet all high speed production requirements. This model has a speed up to 60 strokes per minute with a feed up to 200 feet per minute. Each is variable in proportion. Stock may be 24" to 78" wide. Operation is automatic, semi-automatic or hand controlled. All rollers are covered and designed to continuously bear on outside of coil as coil decreases. The uncoiler is heavy duty of the cradle type and there are many other important features.

If you have special production problems, consult with our engineering staff at No Obligation! Since 1880 "Cleveland" engineers have been designing machinery for American Industry.



Rollers as shown at left are available for the efficient handling of narrow coils.

For more information on "Cleveland" shears or power presses, address inquires to DEPT. 5-A1.

## THE NEW PATENTED "CLEVELAND" DRUM TYPE FRICTION CLUTCH & BRAKE



For greater power press efficiency and reduced production costs, designed to give full clutch and full break, as needed.  $\frac{1}{4}$  the weight of the conventional disk friction clutch and brake, with  $\frac{1}{2}$  the number of parts. Now available for all types, sizes and makes of mechanical power presses. WRITE TODAY FOR FURTHER INFORMATION!

**PUNCHING TOOLS & DIES**

OFFICES AT:  
NEW YORK...CHICAGO  
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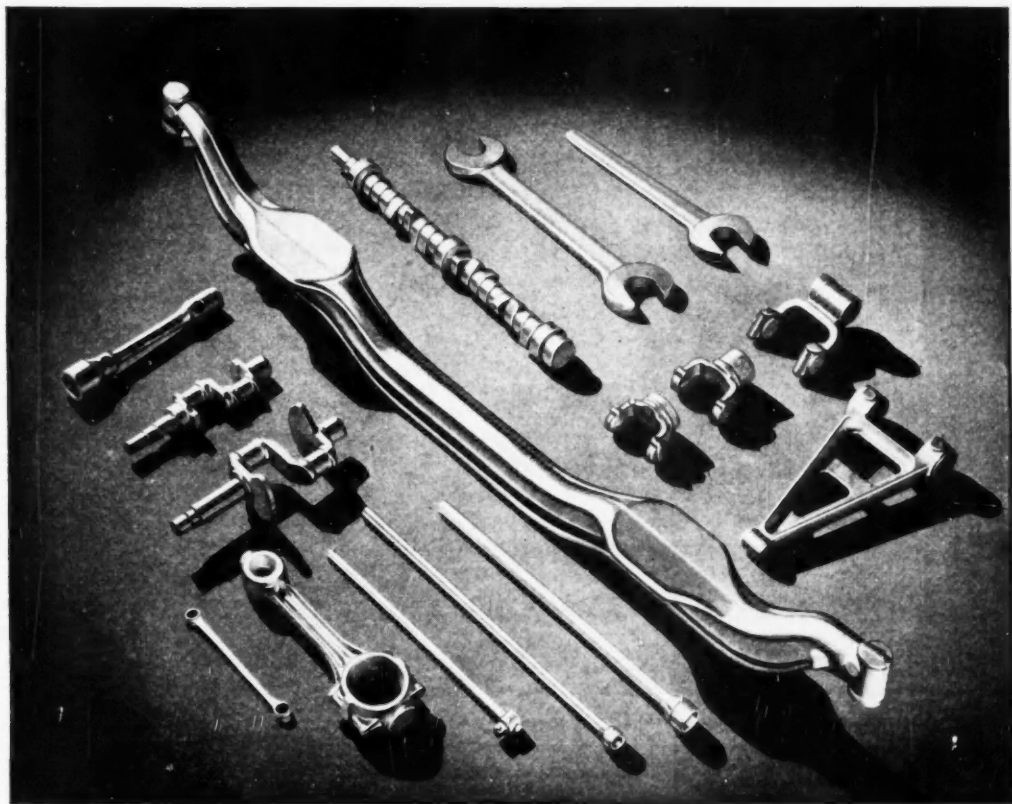
THE  
**CLEVELAND**  
PUNCH & SHEAR WORKS CO.  
U.S.A.

Established 1880

..... POWER PRESSES .....

**FABRICATING TOOLS**

CLEVELAND 14, OHIO



# Herbrand

**DROP FORGINGS**

.....any size or shape up to 200 lbs.

Precision made forgings bearing the Herbrand "Diamond H" trade mark will more than meet your most exacting specifications. Enduring stamina is built into these quality forgings through scientific heat treating in modern automatically controlled furnaces.

Whatever your requirements in forgings, Herbrand is your most faithful source of supply . . . as it has been for hundreds of industries since 1881. Your inquiries are solicited.



SINCE 1881

**Herbrand**

**SUPER-QUALITY DROP FORGINGS**

*...the finest money can buy!*

**HERBRAND DIVISION**

THE BINGHAM-HERBRAND CORP., FREMONT, OHIO

# ...About Your Car Owner Lists



Whatever information an auto owner puts on his license application appears on the new Polk official car owner registration list, now available to you. Every name on a Polk car owner list is "cleaned" ahead of time. Only names of persons to whom mail can be delivered are compiled for you. Polk Car Owner Lists are not "loaded" with extra names that would waste your time and money in sending out mail, or in making personal calls.

*Success or failure of any direct mail advertising program depends on your keeping that list up to date.*

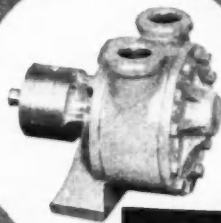
Serving the Automotive Industry and Its Dealers Since 1923

**R.L. POLK AND COMPANY, Direct Mail Advertising Division**

HEADQUARTERS: POLK BUILDING, 431 HOWARD ST. DETROIT 31, MICHIGAN

BRANCHES AND PRODUCTION PLANTS: New York Chicago Philadelphia Cleveland St. Louis Cincinnati Trenton

## SPECIFY THIS COMPACT TUTHILL PUMP



**For Dependable  
High Pressure Service**

This Tuthill Model C K pump is designed to save space, material and money in high pressure service on machine tools, engines and hydraulic devices. Available in capacities up to 50 g.p.m. and pressures up to 400 p.s.i. Direct motor drive, V-belt units and integral drives. Write for Model C K bulletin.

**TUTHILL PUMP COMPANY**

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## The "VERTEX"

*A "Precision" Ignition System  
in A Single Unit*

Designed expressly to eliminate the usual difficulties encountered with battery powered ignition systems the Vertex sets new standards for reliability and performance when fitted to the high speed, high compression engines of today's vehicles.

The Vertex is a packaged unit, tailored exactly to fit the distributor drive mountings of any specified engine.

### Types of Engines Sparked by Vertex

Automotive	Truck	Industrial
Marine	Tractor	Racing

*Full information on request*

**F. T. GRISWOLD MFG. COMPANY**

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WAYNE, PENNA.

Phone Wayne 0341



# VANADIUM

**FOR WELDABILITY**

**WRITE US FOR DATA ON THE SUPERIOR  
WELDING PROPERTIES OF VANADIUM STEELS**

**VANADIUM CORPORATION OF AMERICA**

420 LEXINGTON AVENUE, NEW YORK 17, N. Y. • PITTSBURGH • CHICAGO • DETROIT • CLEVELAND

MAKERS OF  
FERRO-ALLOYS



CHEMICALS  
AND METALS

## Why you and your advertising manager are partners

FROM WHERE YOU SIT, advertising may look like the "glamour department" of your company—necessary, of course, but pretty far removed from the hard-headed realities of the production line.

But take a closer look. In one respect, the advertising manager's job bears a striking resemblance to your own.

You're production-minded. You're concerned with anything that will improve plant procedures, speed up assembly time, prevent waste, and reduce the manufacturing cost per unit.

And that is precisely where you walk arm-in-arm with your advertising manager. Because he thinks the same way about the *manufacture of a sale*.

The whole process of selling and distribution are his assembly line. And every time he can reduce the unit cost of a sale by so much as a few cents, he increases your company's chance to show a profit.

Ask him for a definition of advertising, and he will probably tell you that it is simply *mechanized selling*, a machine that multiplies the productive capacity of the sales force—seeking out prospects, arousing their interest, creating a preference for the things your company makes.

And when it is concentrated among the hand-picked readers of business papers, advertising becomes the most efficient machine this partner of yours has found for lowering the cost of producing a sale.

*What are the ten ways to measure the results of your business paper advertising? You'll find the answers in a recent ABP folder, which we'll be glad to send you on request. Also, if you'd like reprints of this advertisement (or the entire series) to show to others in your organization, you may have them for the asking.*



### AUTOMOTIVE INDUSTRIES

*is one of the 129 members of The Associated Business Papers, whose chief purpose is to maintain the highest standards of editorial helpfulness—for the benefit of reader and advertiser alike.*

## Need help applying small motors to your products?



## Call on Redmond "Customer Engineering Service"



NEXT time you're up against a tough application problem involving low-range power, take advantage . . . full advantage of Redmond's "Customer Engineering Service." It's a complete service . . . specialized . . . maintained solely to help you find exactly the motor you need for the job you want done. And important, too, is the fact that Redmond Company, Inc. specializes exclusively in the design, development and manufacture of Micromotors, small blower units and controllers . . . no complete consumer products to compete with the products of customers.

Redmond Micromotors . . . over 100 standard models with countless variations to meet special requirements. A.C. up to 1/15 horsepower, D.C. up to 1/20 horsepower.



**Redmond**  
COMPANY, INC.  
OWOSSO, MICHIGAN

Offices in NEW YORK, CHICAGO  
DAYTON, LOS ANGELES, DALLAS

EXPANDED FACILITIES • PROMPT DELIVERIES • SERVICE BEFORE AND AFTER THE SALE

AUTOMOTIVE INDUSTRIES, February 15, 1949



## At the Heart of every-day living, *Mr. Manufacturer!*

Wilco Thermometals (thermostatic bimetals) are at the heart of many electrical devices that are at the heart of everyday living. They are at the heart of the electric blanket, the room thermostat, gas or electric water heater, the electric toaster and the electric refrigerator. They perform in the carburetor, the cigaret lighter and instruments of automobiles.

**IN MANUFACTURING PLANTS**, Wilco Thermometals in circuit control and protective devices (such as circuit breakers, motor starting relays, overload cutouts and voltage regulators) enable production equipment to meet the highest standards of performance. Wilco Thermometals reliably activate mechanical devices, such as automotive chokes, draft controls, gas safety pilots . . . Heating Devices—electric coffee makers, electric flat irons, blankets, toasters, gas and electric ovens, refrigerators . . . Instruments—pressure gauges, demand meters, thermometers, thermostats.

**FUNCTIONS** . . . Temperature Indication, Control, Compensation, Sequence Control and many others. Temperature ranges of maximum sensitivity from —50° to 800° F and wide range of electrical resistances. Shapes include strip, straight cantilever blades, U-shapes, spirals and helices . . . or as parts of assemblies.

**WILCO THERMOMETALS** reflect in quality, precision and dependability the H. A. Wilson Company's 34 years of specialization and outstanding achievement in the metallurgical field. WILCO engineers will gladly help you adapt WILCO products to your individual requirements.

**WILCO PRODUCTS INCLUDE:** THERMOSTATIC BIMETALS: All temperature ranges, deflection rates and electrical resistivities. ELECTRICAL CONTACTS: Silver, Platinum, Tungsten, Alloys, Sintered Powder Metal. SILVER CLAD STEEL: For industrial use. NI-SPAN C\* Constant Modulus Alloy; JACKETED WIRE: Silver on Steel, Copper, Invar and many other combinations. SPECIAL ALLOYS: including high conductivity, high strength Copper Alloys. ROLLED GOLD PLATE AND GOLD FILLED WIRE.

\*Reg. Trade Mark, The International Nickel Co., Inc.

### THE H. A. WILSON COMPANY

105 CHESTNUT STREET, NEWARK 5, NEW JERSEY  
Branch Offices: Chicago, Detroit, Los Angeles, Providence



SPECIALISTS FOR 34 YEARS IN THE MANUFACTURE OF THERMOMETALS - ELECTRICAL CONTACTS - PRECIOUS METAL BIMETALLIC PRODUCTS AND SPECIAL ALLOYS



**COMING  
SOON!**

**The  
AUTOMOTIVE  
INDUSTRIES**

**31st ANNUAL  
STATISTICAL  
ISSUE**

to be published  
**MARCH 15, 1949**

... the reference  
manual of the  
**\$11,518,000,000**  
automotive industries

... used for year-round reference  
by **ENGINEERING  
PRODUCTION  
ADMINISTRATIVE  
PURCHASING and  
SALES EXECUTIVES**  
in over 3000 automotive  
manufacturing plants

**AUTOMOTIVE  
INDUSTRIES**

★ ***the issue of the year***

The most valued handbook in the automotive industries is now being prepared. The **AUTOMOTIVE INDUSTRIES** March 15th Statistical Issue is the authoritative reference manual of the industries. First compiled in 1919, it has increased in importance with each succeeding issue.

★ ***crammed with useful data***

This great issue contains a wealth of factual, useful data. It lists engine and vehicle specifications, production and sales totals, aircraft data, general industrial statistics and other information that influential executives of the automotive industries need to formulate their plans.

★ ***gives ads greater impact***

Advertisers obtain top results from ads in this handbook that provides year-round readership. Put sales information on your product at the finger-tips of over 11,000 engineering, production, administrative executives who influence the buying in these plants . . . by placing it in this widely-used manual.

★ ***provides penetrative coverage***

**AUTOMOTIVE INDUSTRIES** Statistical Issue penetrates deeply into the plants producing cars, trucks, aircraft, engines, parts, accessories and other automotive equipment—an \$11,518,000,000 industrial field. Don't miss this powerful medium. Advertising orders are being received, so make your reservation now for a key position.

**AUTOMOTIVE INDUSTRIES**

A CHILTON Publication

Chestnut & 56th Sts. ① Philadelphia 39, Pa.

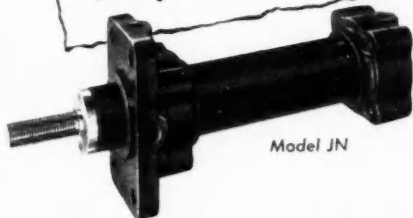
**.. the Automotive Industrial News Magazine**

# HANNIFIN

*Standardized  
for*

1. LOWER COSTS
2. QUICKER DELIVERY
3. SUPERIOR

*Performance*



Model JN

## HYDRAULIC CYLINDERS

ALMOST without exception, the hydraulic cylinder you need to fit even your special applications can be found as a standard unit listed in the big 52 page Hannifin catalog. This is your key to **LOWER COSTS . . . QUICKER DELIVERY . . . SUPERIOR PERFORMANCE.** The Hannifin line is complete! All standard and combination mounting styles . . . bore diameters, 1" to 8" . . . any length stroke . . . standard, double end, or heavy duty (2:1) piston rods . . . with or without cushions. Recommendations on request.



Model BN



Model NCN



Model KCN



Model HON



Model EN



Model CN



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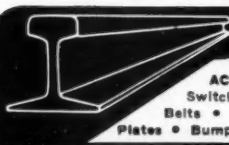
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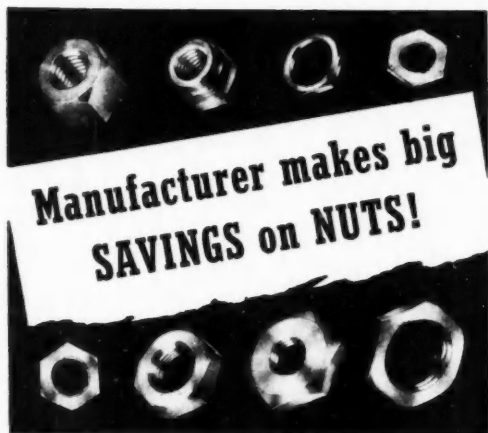
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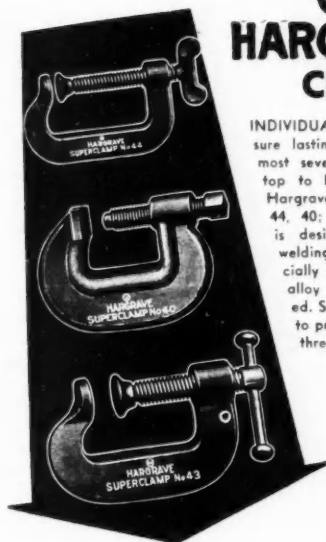
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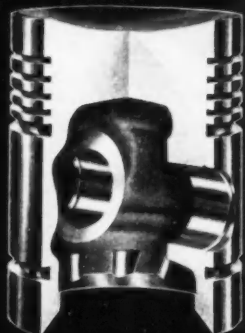
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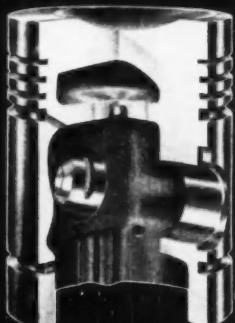
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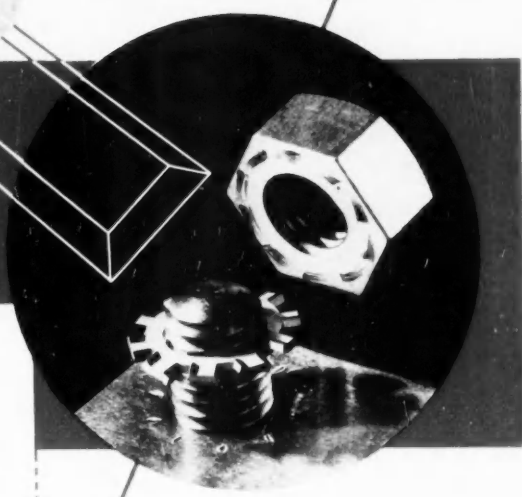
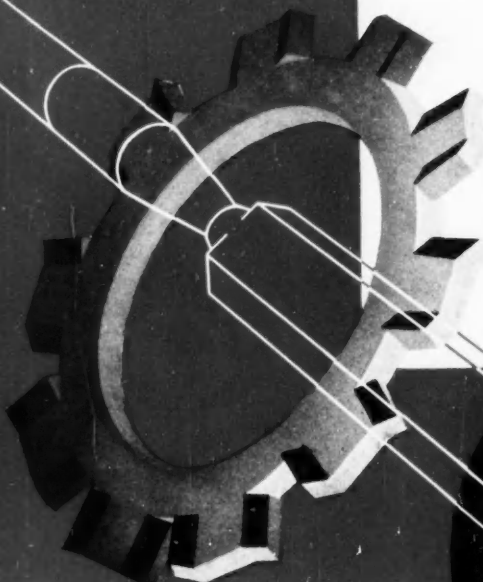
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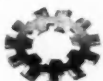
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